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```
6080 IF b(q,13)>1 THEN  LET b(q,
k)=INT (b(q,13)*.9)
6082 RETURN
6085 LET a=aa: LET b=bb: LET b(q
,22)=b(q,22)+INT (300*RND): LET
a(b,a)=a(b,a)-10*c: GO SUB 8636
6090 RETURN
6105 GO SUB 65: IF c=q THEN  RET
URN
6110 IF c<>b(q,9) AND y$="C" THE
N  GO SUB 75: LET m=0: LET n=0
6115 IF c<>b(q,9) THEN  RETURN
6117 IF y$="E" THEN  RETURN
6120 LET g=1: LET k=q: LET r=b(q
,9): GO SUB 8845
6125 IF g=2 THEN  PRINT AT 20,19
;"Enemy";AT 21,19;"attacked": LE
T b(q,28+5*y)=0: RETURN
6127 GO SUB 50: LET a(b,a)=c: LE
T g=5: LET v=b(q,9): GO SUB 8636
: GO SUB 8887: LET g=0
6130 RETURN
6500 PRINT  PAPER 6;"N.B. In all
 cases, players must occupy the
lands of submissive  natives to
control them."
6510 PAUSE h: LET nb=t: RETURN
6700 LET ww=0: FOR k=1 TO p: LET
 b(k,8)=0
6710 LET z=1: IF CODE c$(k,1)=32
 THEN  GO TO 6750
6715 LET b=VAL c$(k,z TO z+1): L
ET a=VAL c$(k,z+2 TO z+3)
6720 GO SUB 50: IF c>6 THEN  GO
TO 6722
6721 LET b(k,8)=b(k,8)+c
6722 IF CODE c$(k,z+4)<>32 THEN
 LET z=z+4: GO TO 6715
6725 IF z>240-p*20 THEN  LET ww=
1
6730 LET b(k,7)=z
6750 NEXT k
6760 RETURN
6800 CLS : PRINT AT 3,0;"You hav
e been recklessly extra- vagant
and owe your Italian      bankers
 "; INK 2;"£";-INT b(q,6)
6805 LET m=7
6810 IF b(q,19)>2 THEN  PRINT AT
 m,0;"They refuse to pay for hal
f yournew ships": LET m=m+3: LET
 z=19: GO SUB 55
6815 IF b(q,32)+b(q,37)+b(q,42)>
400 THEN  PRINT AT m,0;"They ref
use to pay your army:  desertio
n is rife.": LET z=32: GO SUB 55
: LET z=37: GO SUB 55: LET z=42:
 GO SUB 55: LET m=m+3
6825 IF m>9 THEN  PRINT AT 20,0;
"With friends like these ..."
6830 GO SUB 10: RETURN
7000 LET f=0: BORDER 0: PAPER 6:
 CLS : PRINT AT 9,2;"All decisio
ns have been made.  Their conse
quences will now     be revealed
."
7005 GO SUB 10
7007 LET y=0: FOR k=1 TO p: IF b
(k,9)>0 THEN  LET y=1
7008 NEXT k: IF y=0 THEN  GO TO
7100
7010 PAPER 5: CLS : PRINT AT 1,1
3; INVERSE 1;"WARS"
7012 FOR k=1 TO p: PAUSE h: CLS
7015 LET r=b(k,9): IF r<=0 THEN
 NEXT k: GO TO 7100
7017 LET r=b(k,9): IF r>0 THEN
PRINT AT 3,0;FN g$(n$,k);" is at
 war with ";FN g$(n$,r)
7018 LET m=4: IF b(k,14)<=0 THEN
  GO TO 7032
7020 PRINT AT 4,0;"- invasion by
 sea"
7021 PRINT AT 21,0; PAPER 4;"(10
*sp)"; INK 5; PAPER 7;"AAAAAAAAA
AAAAAAAAAAAA": PRINT AT 20,RND*
3; INK 6;"(2*ig3)": PRINT AT 20,
RND*3;"H";AT 20,2+RND*3;"F"
7022 LET x$="E E E(13*sp)": FOR
x=5 TO 15: PRINT AT 20,32-f-x; I
NK 2;x$(1 TO x): PAUSE 8: NEXT x
: IF f=7 THEN  LET f=0: RETURN
7025 IF b(k,14)/(b(r,18)+1)<2 TH
EN  PRINT AT 20,11; INK 1;"B B":
 PRINT AT m,17;":sea battle": LE
T w=k: LET x=14: LET y=r: LET z=
18: GO SUB 8800: GO SUB 7
7027 IF b(k,14)<=0 THEN  FOR l=1
 TO 3: IF b(k,27+5*l)=-1 THEN  L
ET b(k,25+5*l)=0: LET l=3
7028 IF b(k,14)<=0 THEN  NEXT l:
 GO TO 7050
7030 GO SUB 7: PRINT AT m,2;"for
ce landed": LET f=7: GO SUB 7022
: PRINT AT 20,8; INK 2;"II": GO
SUB 7
7032 LET g=0: FOR y=1 TO 3
7033 GO SUB 8850
7034 NEXT y
7035 IF b(k,15)<=0 THEN  GO TO 7
050
7037 LET f=7: PRINT AT m,0;"- bl
ockade": GO SUB 7021
7040 LET w=k: LET x=15: LET y=r:
 LET z=18: GO SUB 8800: GO SUB 7
7045 IF f=1 THEN  LET f=0: LET w
=(b(r,18)+5)/(b(k,15)+5): IF w<1
 THEN  LET b(r,74)=b(r,74)*w
7050 IF b(k,16)<=0 THEN  GO TO 7
095
7055 GO SUB 7: PRINT AT m,0;"- p
iracy"
7060 PRINT AT 20,0;"(32*sp)": PR
INT AT 21,0; INK 5; PAPER 7;"(32
*A)": LET x$="(sp)B B B": FOR x=
1 TO 12: PRINT AT 20,x; INK 1;x$
: NEXT x: PRINT AT 20,22; INK 2;
"E E"
7065 LET w=k: LET x=16: LET y=r:
 LET z=17: GO SUB 8800: GO SUB 7
7070 IF f=1 THEN  LET f=0: LET w
=(b(k,16)+5)/(b(r,17)+5): IF w>1
 THEN  LET b(k,75)=w-1: IF b(k,7
5)>.4 THEN  LET b(k,75)=.3+RND/1
0
7080 PAUSE h
7095 NEXT k
7100 GO SUB 15: LET f=0: CLS : P
RINT AT 1,6; INVERSE 1;"COLONIAL
  PRODUCTION": PRINT AT 2,10;"(s
hiploads)"
7101 GO SUB 6700
7102 FOR k=1 TO p: LET b(k,2)=0
7103 IF INT b(k,8)=0 THEN  GO TO
 7110
7105 LET b(k,2)=(b(k,20)+2*b(k,2
2))/(b(k,8)+1): IF b(k,2)<1 THEN
  LET b(k,2)=b(k,2)*b(k,8): GO T
O 7110
7107 LET y=0: FOR x=1 TO INT b(k
,2): LET y=y+1/x: NEXT x: LET b(
k,2)=b(k,8)*y: IF b(k,11)>0 AND
cr=7 THEN  LET f=2
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7108 IF b(k,63)>RND*50 OR b(k,64
)>RND*h THEN  LET b(k,2)=b(k,2)*
(.9-RND/3)
7110 NEXT k
7120 FOR x=1 TO cr+f: PRINT AT 8
+x,0;FN g$(f$,x): NEXT x: FOR x=
1 TO p: PRINT AT 5,5+(10-p)*x; I
NK x;i$(x): NEXT x
7125 FOR k=1 TO p: FOR l=1 TO cr
+f: LET x$=STR$ (INT (.5+b(k,2)*
b(k,55+l)/h)): PRINT AT 8+l,6+(1
0-p)*k-LEN x$;x$: NEXT l: NEXT k
7130 GO SUB 10: LET g=0
7132 LET l=0: FOR k=1 TO p
7133 IF b(k,74+g)<>1 AND b(k,74+
g)<>0 THEN  LET l=1
7134 NEXT k: IF l=0 THEN  GO TO
7150+g
7135 IF g=1 THEN  GO TO 7151
7136 PRINT AT 1,4; INVERSE 1;"LO
SSES THROUGH BLOCKADE "
7137 FOR k=1 TO p
7138 IF b(k,74)<.1 THEN  LET b(k
,74)=.1+RND/10
7140 NEXT k
7142 FOR k=1 TO p: FOR l=1 TO cr
+f: LET x$="  "+STR$ (INT ((b(k,
2)*b(k,55+l)-b(k,2)*b(k,55+l)*b(
k,74))/h)): PRINT AT 8+l,6+(10-p
)*k-LEN x$;x$: NEXT l: NEXT k
7145 GO SUB 10
7150 LET g=1: GO TO 7132
7151 IF l=0 THEN  GO TO 7180
7155 PRINT AT 1,2; INVERSE 1;"GA
INS/LOSSES THROUGH PIRACY"
7157 FOR k=1 TO p
7158 IF b(k,75)>.24 THEN  LET b(
k,75)=.2+RND/21
7165 LET r=b(k,9): FOR l=1 TO cr
+f
7166 IF r=0 THEN  LET x=0: GO TO
 7168
7167 LET x=b(k,75)*b(r,2)*b(r,55
+l)*b(r,74)
7168 LET b(k,76)=0: LET y=0: FOR
 m=1 TO p
7170 IF m=k THEN  GO TO 7172
7171 IF b(m,9)=k THEN  LET y=y+b
(m,75)
7172 NEXT m
7175 LET b(k,76)=y: LET x$=" "+S
TR$ INT ((x-b(k,2)*b(k,55+l)*y)/
h): IF LEN x$=2 THEN  LET x$=" "
+x$
7176 IF VAL x$>0 THEN  LET x$(1
TO )="+"+x$(2 TO )
7177 PRINT AT 8+l,6+(10-p)*k-LEN
 x$;x$: NEXT l: NEXT k
7178 GO SUB 10
7180 CLS : FOR k=1 TO p: LET b(k
,2)=b(k,2)*b(k,74)*(1-b(k,76)):
NEXT k
7185 GO SUB 15: PRINT AT 1,9; PA
PER 1; INK 7;"SALES IN EUROPE":
PRINT AT 1,27;t: PRINT AT 3,7; I
NK 1;"Total";AT 4,7;"sales";AT 5
,6;"(loads)": PRINT AT 4,13; INK
 2;"Price";AT 5,14;"(£)": PLOT 1
35,103: DRAW 0,-8*(cr+f)
7187 PRINT AT 3,22; INK 3;"Marke
t";AT 4,20;"Share  (%)": FOR x=1
 TO cr+f: PRINT AT 8+x,0;FN g$(f
$,x): NEXT x: FOR x=1 TO p: PRIN
T AT 6,16+3*x; INK x;i$(x): NEXT
 x
7188 FOR k=1 TO p: LET b(k,70)=0
: NEXT k
7190 LET x=0: FOR l=1 TO cr+f: F
OR k=1 TO p: LET x=x+INT (.5+b(k
,2)*b(k,55+l)/h)
7192 IF b(k,9)>0 THEN  LET x=x+I
NT (.5+b(b(k,9),2)*b(b(k,9),55+l
)*b(k,75)/h)
7193 NEXT k: LET q(1,5)=x: LET x
$=STR$ x: PRINT AT 8+l,12-LEN x$
;x$: IF x=0 THEN  LET q(1,4)=q(1
,4)+INT (RND*5)
7195 IF x>0 THEN  LET q(1,1)=q(1
,1)*q(1,2): LET q(1,4)=INT (q(1,
4)+(q(1,1)-x)/q(1,1)*q(1,3)): LE
T q(1,1)=(q(1,1)*3+x)/4
7196 IF q(1,4)<=0 THEN  LET q(1,
4)=1+INT (5.3*RND)
7197 IF q(1,4)>500 THEN  LET q(1
,4)=INT (400+RND*h)
7200 LET x$=STR$ q(1,4): PRINT A
T 8+l,16-LEN x$;x$
7205 FOR k=1 TO p: LET y=INT (.5
+b(k,2)*b(k,55+l)/h)
7207 IF b(k,9)>0 THEN  LET y=y+I
NT (.5+b(b(k,9),2)*b(b(k,9),55+l
)*b(k,75)/h)
7208 IF x>0 THEN  LET y=INT (h*y
/x+.5): LET b(k,70)=b(k,70)+INT
(y*q(1,4)*q(1,5)*b(k,24)/h)
7210 IF y>0 THEN  LET x$=" "+STR
$ y: PRINT AT 8+l,17+3*k-LEN x$;
x$
7212 NEXT k
7215 LET x=0: NEXT l
7220 COPY : GO SUB 10
7225 CLS : PRINT AT 1,5; PAPER 4
;"NATIVE TRADING/LOOTING": FOR k
=1 TO p: LET b(k,2)=0: NEXT k
7230 FOR x=1 TO 21: LET y=0: FOR
 k=1 TO p
7235 IF d(x,k)=1 THEN  LET b(k,2
)=b(k,2)+d(x,7)
7236 IF d(x,k)=2 OR d(x,k)=3 THE
N  LET y=y+1
7240 NEXT k
7245 IF y=0 THEN  GO TO 7255
7247 FOR k=1 TO p
7248 IF d(x,k)=2 OR d(x,k)=3 THE
N  LET b(k,2)=b(k,2)+INT (d(x,7)
/y)
7250 NEXT k
7260 NEXT x
7270 PRINT AT 3,18;"Value of";AT
 4,14;"native trade (£)": FOR x=
1 TO p: LET y=b(x,2)*b(x,74)*(1-
b(x,76)): LET b(x,70)=b(x,70)+IN
T (y*b(x,24)): PRINT AT 6+2*x,2;
 INK x;m$(10*x-9 TO 10*x): LET x
$=STR$ INT b(x,2): PRINT AT 6+2*
x,23-LEN x$;x$: NEXT x:
7275 GO SUB 10
7277 LET f=0
7280 CLS : PRINT AT 1,10; INK 7;
 PAPER 3;"How to win.": PRINT AT
 4,1;"The game ends when one pla
yer  has about "; INVERSE 1;60-
p*5; INVERSE 0;" blocks of land.
": PRINT AT 6,1;"Players score"
7285 PRINT AT 9,3; PAPER 5;"1000
"; PAPER 7;" points for each are
a  of land";AT 13,3;"and";A
T 16,3; PAPER 5;"1"; PAPER 7;" p
oint for each pound in  the
 Treasury (or "; INK 7; PAPER 2;
"-1"; INK 0; PAPER 7;" per
  pound of debt)."
7286 IF f=1 THEN  PRINT AT 20,0;
"(The map for this game is being
  generated.)": RETURN
7287 GO SUB 10
7290 CLS : PRINT AT 3,17;"Points
"
7292 FOR x=1 TO p
7295 IF CODE n$(x*8-7)=32 THEN
PRINT AT 5+2*x,6; INK x;n$(8*x-6
 TO 8*x): GO TO 7300
7296 PRINT AT 5+2*x,6;FN g$(n$,x
)
7300 NEXT x
7302 LET z=1: LET yy=-10000: FOR
 x=1 TO p: LET y=b(x,7)*250+b(x,
6)+b(x,70)
7306 IF y>yy THEN  LET z=x: LET
yy=y
7320 LET x$=STR$ INT y: PRINT AT
 5+2*x,23-LEN x$;x$: NEXT x
7330 PRINT AT 20,6; FLASH 1;FN g
$(n$,z); FLASH 0;" is winning!"
7340 IF ww=1 THEN  GO TO 5000
7350 COPY : GO SUB 10
7430 PAUSE h: CLS : PRINT "EVENT
S": PRINT " ": FOR k=1 TO p
7432 LET z=1
7450 LET x=b(k,8)/(b(k,7)+1): IF
 x<.6 THEN  LET x=.6
7452 IF x>1.1 THEN  LET x=1.1
7455 LET b(k,20)=INT (b(k,20)*x)
7457 FOR y=1 TO 3: LET b(k,27+5*
y)=INT (b(k,27+5*y)*x): NEXT y
7460 LET b(k,22)=INT (b(k,22)*(x
-.2)): IF x<.2<.6 AND RND>.7 THE
N  PRINT "Epidemic among ";m$(k*
10-9 TO k*10);" slaves"
7470 FOR x=1 TO 21
7472 IF d(x,k)=0 THEN  GO TO 748
5
7475 LET y=INT (RND*1.9-RND*1.9)
7480 LET w=d(x,k): IF y<>0 AND w
+y<6 AND w+y>0 THEN  LET d(x,k)=
w+y: PRINT "The ";e$(x);s$(d(x,k
)*12-11 TO d(x,k)*12);FN g$(n$,k
): IF d(x,k)=1 AND nb<>t THEN  G
O SUB 6500
7485 LET d(x,7)=INT (d(x,7)*(1-R
ND/3+RND/3)): NEXT x
7490 NEXT k
7500 PAUSE h: CLS : IF RND>.85 T
HEN  CLS : PRINT AT 9,0;"The POP
E proclaims peace betweenChristi
ans. No wars are allowed next tu
rn (except against the  natives
.)": FOR k=1 TO p: LET b(k,5)=0:
 NEXT k: GO TO 7900
7515 LET w=0: FOR k=1 TO p
7516 IF b(k,11)>1 THEN  LET w=1
7517 NEXT k: IF w=1 AND cr=7 THE
N  LET cr=9
7520 IF RND>.9 AND cr>8 AND cr<1
1 THEN  LET cr=cr+1: CLS : PRINT
 AT 9,0;FN g$(f$,cr);"is introdu
ced into the  New World.": GO TO
 7900
7540 GO SUB 60: IF b(k,6)>-h AND
 RND>.85 THEN  PRINT AT 9,1;"Pro
ducts from the East Indies  dis
rupt demand for your goods.": FO
R l=1 TO cr: LET q(1,1)=q(1,1)*(
1-RND/2): NEXT l: GO TO 7900
7580 CLS : GO SUB 60: IF b(k,6)>
RND*h AND b(k,24)>.25 AND RND>.5
 THEN  FOR x=1 TO p: LET b(x,70)
=b(x,70)*(1-b(x,24)): NEXT x: PR
INT AT 9,0;"All states are affec
ted by tax  evasion, (some more
than others)but savage penalties
 ensure thatit is a short-lived
phenomenon.": GO TO 7850
7600 CLS : GO SUB 60: IF b(k,6)>
RND*h AND RND>.5 THEN  PRINT AT
9,1;"Your (mercenary) forces dem
and  a pay rise.": LET m2=INT (m
2*1.2): PAUSE 300
7620 LET w=1: FOR k=1 TO p:
7622 IF b(k,25)>=b(w,25) THEN  L
ET w=k
7625 NEXT k: IF b(w,25)=1 THEN
GO TO 7900
7630 CLS : IF RND>.6 THEN  PRINT
 AT 9,0;m$(10*w-9 TO 10*w);" shi
p design boosts";AT 10,0;"receip
ts from entrepot trade.": FOR k=
1 TO p: LET b(w,70)=b(w,70)+(.1*
b(k,70)/b(k,24))
7900 GO SUB 10: GO TO 200
8000 DIM a(17,21)
8005 LET m=2+RND*4: LET n=RND*5-
RND*5+3
8010 FOR x=1 TO 21
8015 LET m=m+RND*3-RND*3: LET n=
n+RND*4-RND*4
8020 IF m>6 THEN  LET m=6-RND*2
8025 IF m<0 THEN  LET m=RND*3
8030 IF n<0 THEN  LET n=RND*3
8035 IF n>10 THEN  LET n=10-RND*
3
8037 IF x=21 THEN  LET n=4*RND:
LET m=2*RND
8040 IF m>0 THEN  FOR k=1 TO m:
LET a(7-k,x)=1: NEXT k
8045 IF n>0 THEN  FOR k=1 TO n:
LET a(6+k,x)=1: NEXT k
8050 IF x<21 AND n<6*RND THEN  L
ET a(8+n,x)=1
8055 IF n<7*RND AND RND>.7 THEN
 LET a(9+n,x)=1
8060 NEXT x
8065 FOR y=1 TO 21: FOR x=1 TO 1
7
8070 IF a(x,y)=0 THEN  GO TO 809
5
8075 LET a(x,y)=INT (3+RND*4.5):
 GO SUB 8900
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8080 IF x=1 OR y=1 THEN  GO TO 8
095
8085 IF RND>.6 AND a(x,y-1)>1 TH
EN  LET a(x,y)=a(x,y-1): GO TO 8
095
8090 IF RND>.7 AND a(x-1,y)>1 TH
EN  LET a(x,y)=a(x-1,y)
8100 NEXT x: NEXT y
8200 DIM d(21,7): FOR k=6 TO 26:
 LET n=0
8210 LET x=1+RND*15: LET y=1+RND
*19
8215 IF a(x,y)=0 OR a(x,y)>7 THE
N  LET n=n+1: IF n<5 THEN  GO TO
 8210
8217 IF n>=5 THEN  GO TO 8250
8220 LET a(x,y)=a(x,y)+10*k: LET
 d(k-5,6)=99+INT (RND*1000): LET
 d(k-5,7)=RND*2000
8225 IF a(x+1,y)<>0 AND a(x+1,y)
<7 THEN  LET a(x+1,y)=a(x+1,y)+k
*10
8227 IF x<15 AND INT (a(x+1,y)/1
0)=k THEN  IF a(x+2,y)<>0 AND a(
x+2,y)<7 THEN  LET a(x+2,y)=a(x+
2,y)+k*10
8230 IF a(x,y+1)<>0 AND a(x,y+1)
<7 THEN  LET a(x,y+1)=a(x,y+1)+k
*10
8235 IF y>2 THEN  IF a(x,y-1)<>0
 AND a(x,y-1)<7 THEN  LET a(x,y-
1)=a(x,y-1)+k*10
8250 NEXT k
8260 RETURN
8410 GO SUB 50: IF a(b,a)>57 THE
N  PRINT AT a,b; PAPER c;"G": GO
 SUB 6000: RETURN
8412 IF a(b,a)<=57 AND a(b,a)>7
THEN  PRINT AT a,b; PAPER c;i$(I
NT (a(b,a)/10)+.1): GO SUB 6000:
 RETURN
8420 PRINT AT a,b; PAPER c;"(sp)
": IF y$="C" THEN  GO SUB 8636
8450 RETURN
8500 LET m=1: IF CODE c$(z,1)=32
 THEN  PRINT AT 13,20;"No coloni
es": PAUSE h: RETURN
8510 LET b=VAL c$(z,m TO m+1): L
ET a=VAL c$(z,m+2 TO m+3)
8515 GO SUB 50: PRINT AT a,b; PA
PER c;i$(z): GO TO 8525
8525 IF CODE c$(z,m+4)<>32 THEN
 LET m=m+4: GO TO 8510
8550 RETURN
8600 LET g=0: LET y$="E": PRINT
AT 14-q*2,17;y$
8605 LET l1=0: LET l=0: LET a=14
-2*q: LET b=17
8615 LET f=1
8617 LET m=0: LET n=0: PRINT AT
15-g,19;"Where ?      ";AT 16-g,1
9;"Enter n,s,e";AT 17-g,19;"or w
": LET x$=INKEY$: IF f=2 THEN  P
RINT AT 18-g,19;"or x for next";
AT 19-g,19;"force": FOR z=14 TO
21: PRINT AT z,19;"(12*sp)": NEX
T z
8618 IF x$="" THEN  GO TO 8617
8620 IF CODE x$=110 THEN  LET m=
-1
8621 IF CODE x$=115 THEN  LET m=
1
8622 IF CODE x$=101 THEN  LET n=
1
8623 IF CODE x$=119 THEN  LET n=
-1
8624 IF f=2 AND CODE x$=120 THEN
  RETURN
8625 IF (m=0 AND n=0) OR a+m<1 O
R a+m>21 OR b+n<1 OR b+n>17 THEN
  BEEP .5,.5: GO TO 8617
8627 LET b=b+n: LET a=a+m: IF f=
2 THEN  RETURN
8630 IF a(b,a)=0 THEN  LET l=l+.
04-(t-1492)/1000: PRINT AT a,b;y
$: PRINT AT a-m,b-n; PAPER 5; IN
K 7;"A": GO TO 8660
8635 LET l1=l1+.25: GO SUB 8410:
 PRINT AT 19,19;"(9*sp)";AT 20,1
9;"Land ahoy!";AT 21,19;"(3*sp)"
: IF a(b,a)>7 THEN  GO TO 8655
8636 LET w$=STR$ b: IF LEN w$=1
THEN  LET w$="0"+w$
8637 LET z$=STR$ a: IF LEN z$=1
THEN  LET z$="0"+z$
8640 LET d=b(q,7): IF k=13 THEN
 LET b(q,20)=b(q,20)+INT (b(q,21
)*.9): LET x=b(q,20): LET mm=m:
LET m=4: INK 7: PAPER 4: GO SUB
20: LET b(q,21)=0: PAPER 6: LET
m=6: LET x=0: GO SUB 20: GO SUB
15: LET m=mm
8642 IF a(b,a)>0 THEN  LET c$(q)
=c$(q, TO d)+w$+z$
8644 LET d=b(q,10): IF a(b,a)=4
OR a(b,a)=3 THEN  LET b(q,10)=d+
1: IF a(b,a)=3 THEN  LET b(q,10)
=d: LET b(q,11)=b(q,11)+1
8645 GO SUB 50: IF a(b,a)>0 THEN
  LET a(b,a)=c+10*q: LET b(q,7)=
b(q,7)+4
8650 IF f=2 OR f=3 THEN  RETURN
8655 LET a=a-m: LET b=b-n
8657 IF l1>RND THEN  PRINT AT 18
,19;"Ships return": PAUSE h: PRI
NT AT a,b; PAPER 5; INK 7;"A": R
ETURN
8660 IF l>RND AND b(q,13)>1 THEN
  LET b(q,13)=b(q,13)-1: PRINT A
T 18,19;"Ship lost": PAUSE h: PA
USE h: PRINT AT 18,19;"(9*sp)"
8665 IF l>RND AND b(q,13)=1 THEN
  LET l1=2: GO TO 8657
8670 GO TO 8615
8700 IF k=17 AND b(q,7)=0 THEN
RETURN
8702 IF k=14 AND b(q,9)=0 THEN
RETURN
8703 INPUT "Which force (1-3) or
 0 ? ";x$
8704 LET n=3: GO SUB 40: LET z=V
AL x$: IF z=0 THEN  NEXT k
8705 IF b(q,27+5*z)>b(q,k)*50 TH
EN  LET b(q,27+5*z)=b(q,k)*50
8715 FOR x=1 TO 21: PRINT AT x,0
; INK 1;CHR$ (x+96): NEXT x
8720 INPUT "Which row ? (a-u) ":
x$
8725 IF CODE x$<97 OR CODE x$>11
7 THEN  BEEP .5,.5: GO SUB 25: G
O TO 8720
8730 FOR x=1 TO 17: PRINT AT 0,x
; INK 1;CHR$ (x+96): NEXT x
8735 INPUT "Which column (a-q) ?
 ";y$
8740 IF CODE y$<97 OR CODE y$>11
3 THEN  BEEP .5,.5: GO SUB 25: G
O TO 8730
8745 LET b=CODE y$-96: LET a=COD
E x$-96
8747 IF a(b,a)=0 THEN  PRINT AT
18,19;"That's sea!";AT 19,19;"Tr
y again.": GO TO 8720
8750 IF a+1<=21 THEN  IF a(b,a+1
)=0 THEN  GO TO 8760
8751 IF a-1>=1 THEN  IF a(b,a-1)
=0 THEN  GO TO 8760
8752 IF b+1<18 THEN  IF a(b+1,a)
=0 THEN  GO TO 8760
8753 IF b-1>0 THEN  IF a(b-1,a)=
0 THEN  GO TO 8760
8755 PRINT AT 18,19;"There is no
";AT 19,19;"sea route.": GO TO 8
720
8760 GO SUB 65: IF k=17 AND c<>q
 THEN  PRINT AT 18,19;"Not a col
ony.": GO TO 8720
8765 IF k=14 AND c<>b(q,9) THEN
 PRINT AT 18,19;"Not an enemy.":
 GO TO 8720
8780 LET b(q,25+5*z)=a: LET b(q,
26+5*z)=b: LET b(q,28+5*z)=0: PR
INT AT a,b;"C": IF k=14 THEN  LE
T b(q,28+5*z)=-1
8790 RETURN
8800 LET f=0: GO SUB 7: LET v=(b
(w,x)*b(w,25)+1)/(b(y,z)*b(y,25)
+1)*(1+RND/2-RND/2)
8810 IF v<1 THEN  PRINT AT m,2;"
attacker defeated": LET b(w,x)=I
NT (b(w,x)-2*b(y,z)/v)
8815 IF v>=1 THEN  LET f=1: PRIN
T AT m,2;"defender defeated": LE
T b(y,z)=INT (b(y,z)-v/2*b(w,x))
8820 IF b(w,x)<=0 THEN  LET b(w,
x)=0
8822 IF b(y,z)<=0 THEN  LET b(y,
z)=0
8825 RETURN
8845 LET w=a: LET x=b
8847 IF b(q,9)=0 THEN  RETURN
8848 GO TO 8851
8850 LET g=0: LET w=b(k,25+5*y):
 LET x=b(k,26+5*y)
8852 IF w=0 THEN  RETURN
8855 LET u=0: FOR l=1 TO 3: LET
co=0: LET o=b(r,25+5*l): LET u=b
(r,26+l*5)
8860 IF w=o AND x=u THEN  LET co
=1
8862 IF g=1 AND co=1 THEN  LET l
=3: NEXT l: LET g=2: RETURN
8863 IF co=1 THEN  GO SUB 8870
8865 NEXT l: IF co=0 AND INT (a(
x,w)/10)=k THEN  RETURN
8868 IF co=0 THEN  LET f=3: GO T
O 8882
8870 PRINT AT m,0;"- land battle
": LET v=(b(k,27+5*y)+1)/(b(r,27
+5*l)+1)*(RND/2-RND/2+1)
8875 IF v>1 THEN  PRINT AT m,17;
"attacker wins": GO SUB 7: LET b
(r,27+5*l)=INT (b(r,27+5*l)-(v/2
*b(k,27+5*y))): LET f=3: IF b(r,
27+5*l)<=0 THEN  FOR z=1 TO 4: L
ET b(r,24+z+5*l)=0: NEXT z
8880 IF v<=1 THEN  PRINT AT m,17
;"defender wins": GO SUB 7: LET
b(k,27+5*y)=INT (b(k,27+5*y)-(2/
v*b(r,27+5*l))): LET f=2: IF b(k
,27+5*y)<=0 THEN  FOR z=1 TO 4:
LET b(k,24+z+5*y)=0: NEXT z
8882 LET a=w: LET b=x: IF f=2 TH
EN  LET q=r
8883 IF f=3 THEN  LET q=k
8884 IF INT (a(b,a)/10)<>q THEN
 GO SUB 8636
8885 IF q=r THEN  LET v=k: GO TO
 8887
8886 IF q=k THEN  LET v=r
8887 LET z=1: IF CODE c$(v,1)=32
 THEN  LET b(v,7)=0: LET b(v,8)=
0: RETURN
8888 IF VAL c$(v,1 TO 2)=b AND V
AL c$(v,3 TO 4)=a THEN  LET c$(v
,1 TO )=c$(v,z+4 TO b(v,7)): GO
TO 8892
8890 IF VAL c$(v,z TO z+1)=b AND
 VAL c$(v,z+2 TO z+3)=a THEN  LE
T c$(v,1 TO )=c$(v,1 TO z-1)+c$(
v,z+4 TO b(v,7))
8892 IF CODE c$(v,z+4)<>32 THEN
 LET z=z+4: GO TO 8890
8893 LET b(v,7)=b(v,7)-4: GO SUB
 50: LET ti=b(v,10): IF c=4 OR c
=3 THEN  LET b(v,10)=ti-1: IF c=
3 THEN  LET b(v,10)=ti: LET b(v,
11)=b(v,11)-1
8897 RETURN
8900 IF a(x,y)=5 AND RND>.5 THEN
  LET a(x,y)=4
8910 IF a(x,y)=5 AND RND>.4 THEN
  LET a(x,y)=6
8915 IF a(x,y)=5 THEN  LET a(x,y
)=3
8920 RETURN
9100 LET f=0: LET e=.75
9101 LET a=.5*e: LET b=.25*e: LE
T c=.375*e: LET d=.125*e
9105 BEEP b,9: BEEP a,12: BEEP b
,14: BEEP c,16: BEEP d,17: BEEP
b,16: BEEP a,14: BEEP b,11: BEEP
 c,7: BEEP d,9: BEEP b,11: LET f
=f+1: IF f=2 THEN  GO TO 9112
9107 BEEP a,12: BEEP b,9: BEEP c
,9: BEEP d,8: BEEP b,9: BEEP a,1
1: BEEP b,8: BEEP a,4: IF f=3 TH
EN  GO TO 9115
9110 IF f=1 THEN  GO TO 9105
9112 BEEP c,12: BEEP d,11: BEEP
b,9: BEEP c,8: BEEP d,6: BEEP b,
8: BEEP (a+b),9: BEEP b,9: PAUSE
 (b*50)
9115 BEEP (a+b),19: BEEP c,19: B
EEP d,18: BEEP b,16: BEEP a,14:
BEEP b,11: BEEP c,7: BEEP d,9: B
EEP b,11: LET f=f+1
9117 IF f=3 THEN  GO TO 9107
9125 BEEP c,12: BEEP d,11: BEEP
b,9: BEEP c,8: BEEP d,6: BEEP b,
8: BEEP (a+b),9: BEEP a,9
9130 RETURN
```
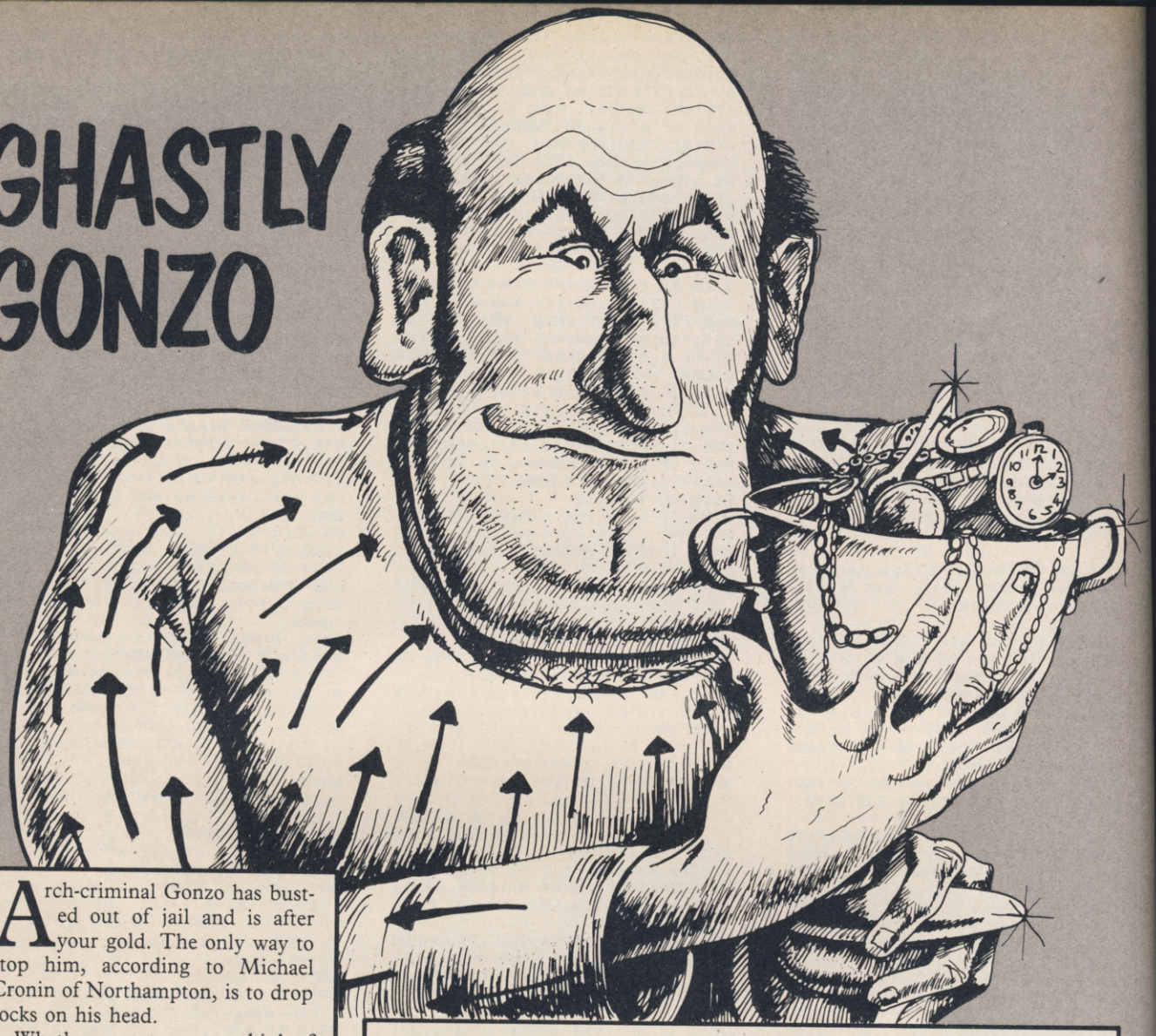

GHASTLY GONZO



Arch-criminal Gonzo has busted out of jail and is after your gold. The only way to stop him, according to Michael Cronin of Northampton, is to drop rocks on his head.

Whether or not you can think of more desirable methods of dealing with burglars, **Ghastly Gonzo** runs on the ZX-81 in 16K, and demonstrates how clever use of the character set in Inverse mode can juice up a game's graphics considerably.

```
  5 GOSUB 360
  6 LET RAND=INT (RND*25)+1
  10 LET SC=0
  11 LET F=0
  12 LET HIT=0
  30 LET HI=0
  40 LET LIFES=2
  50 LET X=5
  80 LET Y=2
  85 LET G=0
  86 REM MICHAEL CRONIN
  70 FOR N=0 TO 21
  80 PRINT AT N,0;"
                    "
  90 NEXT N
  91 FOR A=0 TO 80
  92 PRINT AT INT (RND*21),INT (
RND*31);"."
  93 NEXT A
 100 PRINT AT 21,0;"
                    ";AT 20,0;"
 105 PRINT AT 19,0;"
                    ";AT 18,0;"
 110 PRINT AT 2,29;"
                    "
 111 PRINT AT 2,RAND;"."
 112 PRINT AT 0,0;"+ + + +
```

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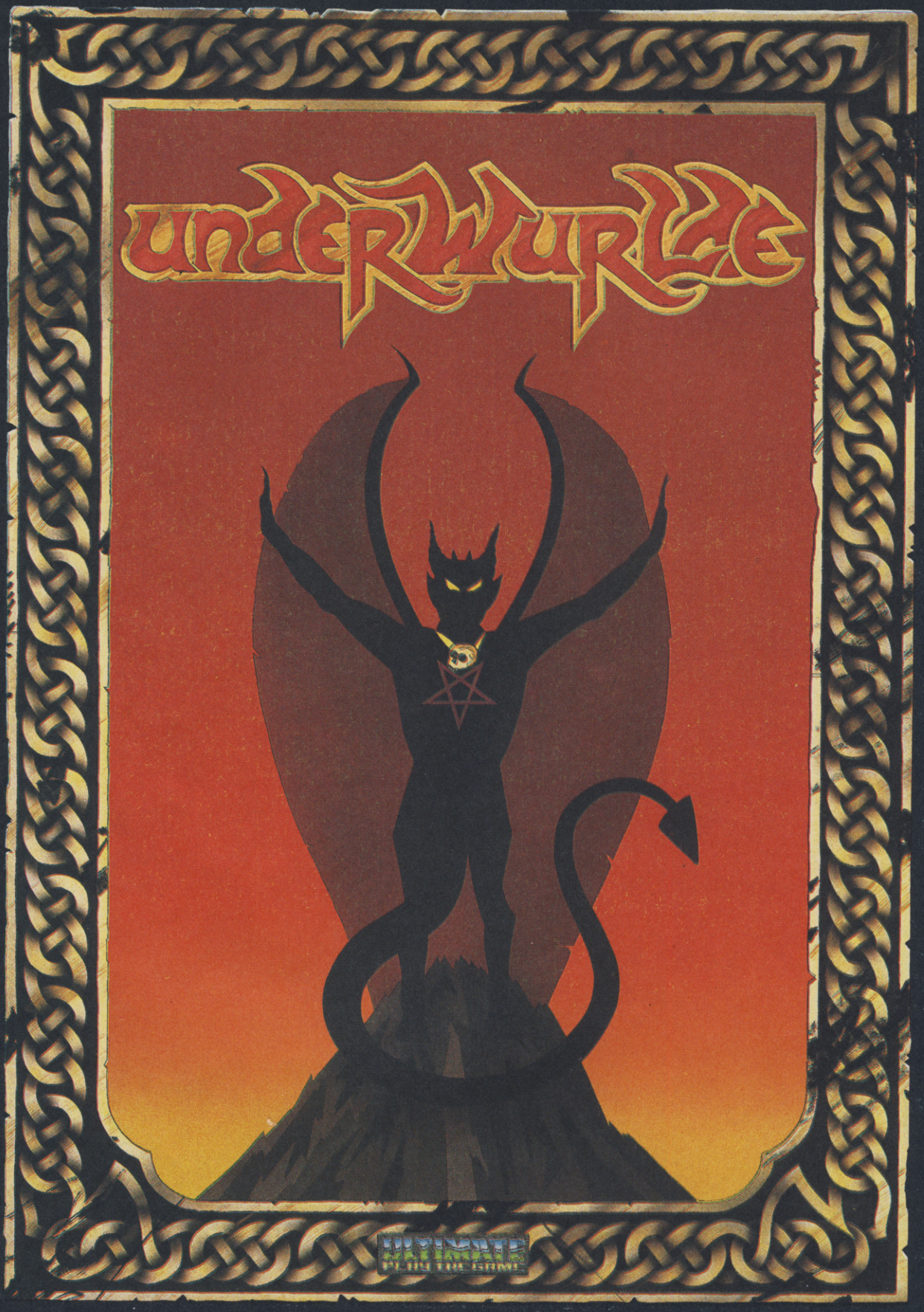

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Illustration: Graham Ward

Escape from the modern world

Richard Price looks at some contemporary adventures

WHEN YOU are on the hunt for a new adventure what is it you are looking for?

You will naturally expect the game to have playability — that combination of technical factors most of us take for granted when we buy commercial programs. You have a right to demand a decent vocabulary, good response time and a flexible interpreter which comes across with some sort of personality during play. You will assume the writers have devised carefully designed puzzles set into a coherent structure.

Those are the requirements of any good game but it is fair to say that an adventure's success and the satisfaction it gives you will be decided mainly by the quality of its plot and the atmosphere it generates.

All of us want an escape into other worlds at times to savour the pleasure of being someone or somewhere else. That fantasy is the core of the appeal of computer adventure. Fantasy, though, is fragile and, whether you prefer heroic, modern or futuristic scenarios, the setting you make your journey in must hold your belief right to the end.

Quite often people will say that fantasy works by suspending your disbelief. Tolkein himself did not think that was a convincing explanation of the way the mind handles fantasy. In *Tree and Leaf,* his short work about fairy stories, he put forward the idea that the writer — or games designer in our case — creates a 'secondary' world which your mind can enter. Once inside it you believe the general setting, the characters and action are true — meaning that they all obey the proper laws of their own world. The spell held over you may well be broken by some jarring intrusion from the real world or simply because the characters behave in a way that is out of kilter with the logic of their surroundings.

Far too many programs feature plots which, for instance, ask you to rescue a princess, find the scattered bits of some talisman or simply slash your way through a monster-infested cave riddled with rising damp and littered with treasures which no sorcerer in his right mind would leave lying around.

You may not be too happy to be regularly cast as a Conan-clone whose fist is bigger than his brain. That must be desperately aggravating for female adventurers who are expected to undergo a mental sex-change before powering up their Spectrums. If software companies are going to survive then they had better start looking for games which will appeal to a much wider public than is currently the case.

To be fair, there is a growing variety of styles and plots in the adventure genre but games that use real story lines are still pretty thin on the ground. The concept of bookware, though, seems to be taking off. Creating computer implementations of successful stories has some obvious advantages as the books have already proved that their 'secondary' worlds can hold people's attention and imagination. It still does not mean that the program will necessarily match up to the excitement or invention of the original but if the programmers are sensitive about the adaptation there is a chance of a good fit. Of course, the memory size of home micros also imposes rigid boundaries and limitations.

If you are an amateur programmer searching for a theme there is nothing to stop you turning your favourite pulp fiction into an adventure for home consumption.

At the sign of THE DANCING OGRE

If you are bored with magic and monsters history can provide equally exciting themes. Your heroine or hero could attempt to infiltrate the lair of the Old Man of the Mountains, the original master of the feared Assassins at the time of the Crusades. Deserts, strange nomads, wild mountains and grim fortresses guarded by fanatical killers all have their place in this adventure.

There are some programs which meet all or most of the criteria for successful secondary worlds and yet mirror the preoccupations and paranoias of our own times. They reflect different angles of life and often carry some sharp social comment.

Urban Upstart from Richard Shepherd Software depicts the grim emptiness of inner-city life. Imagine any decaying ex-industrial town in Britain and you will have an idea of what it is like to live in Scarthorpe. No jobs, no money, nothing to do. No one will wander the streets. Thuggish skinheads and paranoid police rule here.

You must comb the town and find the means to escape. Your own character is pretty suspect and not above theft and fraud to raise much-needed cash. The mean streets are depicted in location graphics but the format is traditional text adventure and tricky at that.

The game may not seem like escapism and it is not difficult to recognise parallels with Cut Throat Alley or Grime Street. Definitely a slice of social realism with a gritty, dangerous, feel to it, though not without flashes of humour.

If you are one of those gamesters who thinks adventures written on the Quill cannot match the real thing then **Hampstead** could provide a cure for your scepticism. The technical presentation may be defined by the utility but the subject matter and approach is new and genuinely funny.

There you are, stuck in your nasty smelly flat somewhere in the wilderness of north-west London, parked in front of *3-2-1* on the telly. The only way is up — so you think — and you nip out in search of the dole office to get your giro. Outside the back yard, gleaming in the sunlight, is a sign pointing to Hampstead. Nothing can stop you now, so you cross your personal Jordan and pedal towards the Promised Land only to find you cannot attain Hampstead simply by going there. You will have to change your style and your gear, read the right books and do the right things with the right people.

continued on page 124

Up here on the Enkash Moors winter comes early and the wolves have been howling around the fence these last few weeks. The Dancing Ogre *is in a lonely spot but the southern caravan route passes close by and a steady trickle of travellers and adventurers will overnight here — especially in this cold season when the nights are long and the beasts of the wilderness grow leaner and hungrier. The tap room is full of talk and argument and I hear tall tales that get taller by the minute after a few cups of Krean wine.*

Time after time I meet those who have travelled without success in the icy wastes of **Valhalla,** *the afterworld of the northern barbarians. A map in my possession may help Sheila from the township of Cambridge — she seeks Drapnir the ring of power. There are Pits in Hel and if she journeys east from there to a cave she will be able to jump to another part of Hel. North of here lies Despair. North once more will bring her to the ring.*

Another lady, known only to me as Byford the Fair, has faced similar problems in that chill place; let us hope she finds solace in this news. Few women pass by the tavern — more's the shame. I would like to know why they go adventuring and how they fare in a trade dominated by men. More power to their sword arms!

Deep in his ale one night, Robert the Nailer, from Devizes Town, confessed he had been searching for the fabled land of **Hampstead** *over many weeks. Though he had boarded a train and met a trader in antiques caller Perrier, he could get no further and was spurned by this odd creature.*

In my youth — before I worked as a mercenary for Prince Janga in Maru — I visited the place myself. Set in a maze, amongst the filth and fumes of orcish factories, there is a great treasure. Perrier will be eager to buy this artifact. Robert should thus find his way open, though final success will still be a long way off. To find the secret of the maze he will have to drop his belongings one by one and make a map, for the place is small but tricky.

My thanks to Mark Talbot, an initiate of great skill from the temple of Surclaif at Loughborough. He has sent me the map to Scarthorpe, that forbidden city of despair. Other students of **Urban Upstart** *should take note — if you do not carry a book on the art of flying with you you will never escape from this dismal place of ruins. The key will also be necessary.*

Philip James of North Wales has been examining the intricate and secret codes contained in **System 15000.** *He has found a number attached to the name 'KP Codes' but can't grasp its significance. It is easy to become lost in this strange ritual but it is always wise to return to earlier contacts. If Philip uses this number at Kingsdown he'll discover much to his advantage. Also if you wish to get information from Selcra you must always place a message on the board first — enter 'Selcra' followed by the name of the organisation.*

There are still those who brave the Third Continent on the trail of the **Black Crystal.** *Hammerfist Pelaez from London dropped in not two moons ago, tired from his struggles in the Shoggoth's lair. Although he was refreshed by a side of bacon and a stoup of mead I was unable to help him more. He seeks the location of the Shoggoth's treasure chamber and the way out from its prison.*

If you pass by the **Ogre** *come in and talk with me — perhaps you have some advice to give him. Whether you need aid or can give it you're welcome up here on the Moors. Safe journey to you all.*

Gordo Greatbelly, Landlord.

If you have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, *67 Clerkenwell Road, London EC1R 5BH.*

continued from page 123

Not being totally stupid you will lie, cheat, even steal to get to this Nirvana of NW10 but you must avoid violence at all costs. The game is not merely about finding the right objects — it is also about attitudes as you must work out ways of making the correct deals. The answers are devious.

This is good situation comedy from Melbourne House and the game is attractively presented with a hilarious handbook. It is arguably one of the best Quilled adventures to date.

From this comfortable tweedy fantasy we descend into a shifting, threatening underworld of conspiracy, espionage and fear. A series of audio messages are recorded on your answering machine. Their growing urgency and the sound of a final shot leave you in no doubt — **Valkyrie 17** is active again, a cell of neo-Nazis whose deadly tentacles stretch around the world.

Thanks to the dying gasps of your agent you know their ruthless leader is holed up in an exclusive Austrian skiing resort at the Glitz Hotel. Your job is to seek him out and neutralise him. Take care; one foolish move and you will find yourself face down in the snow rapidly becoming a member of the great majority.

The level of paranoia is pumped up by ringing phones which, if answered, threaten you and make it clear that your cover is already broken. Everything a good thriller needs is here — locked safes, half-overheard conversations, blood on the crisp snow of the piste.

Valkyrie 17 is produced by the Ram Jam Corporation, a new outfit, and features detailed atmospheric descriptions. The location graphics are interactive and will change to show the results of significant actions. No help is given and you are absolutely on your own in a race against danger.

Isolation and danger are also the major themes of **System 15000** from AVS. This is no standard text adventure but it is definitely one of the most gripping and compulsive Spectrum games so far. A brief note informs you that Comdata Company has been ripped off for a cool million or more bucks in a computerised bank fraud. Lurking behind the heist are the mob, ominous and menacing. Your single lead is one phone number.

On loading you will find only the user screen of the 15000 network and the basic instructions on how to operate it. From that beginning you must penetrate the files of the other computers which use the net to uncover the twisting threads of the plot. The giant mainframes of the international banks are well protected against intruders and police data protection squads will shut the system down temporarily once they get a sniff of what you are up to. Stay cool and keep dialling — piece by piece you will edge your way towards the truth and attempt to restore the Comdata lost millions.

Your only input routines are phone numbers and an occasional cryptic note on the message board. There is no need to take on any role — this is you against the network in the here and now, deep in the loneliness of the long-distance hacker.

After hours of tracing leads you will find yourself cheering in triumph as you enter the files of the Reserve Manhattan Bank with its glittering stars and stipes logo or you will curse in frustration as yet another faceless machine informs you that your data is bad. You will begin to sense the network as very real, a vast jigsaw of numers, names and details. **System 15000** is utterly absorbing and compelling and recalls the atmosphere of the BBC series *Bird of Prey*. Absolutely recommended.

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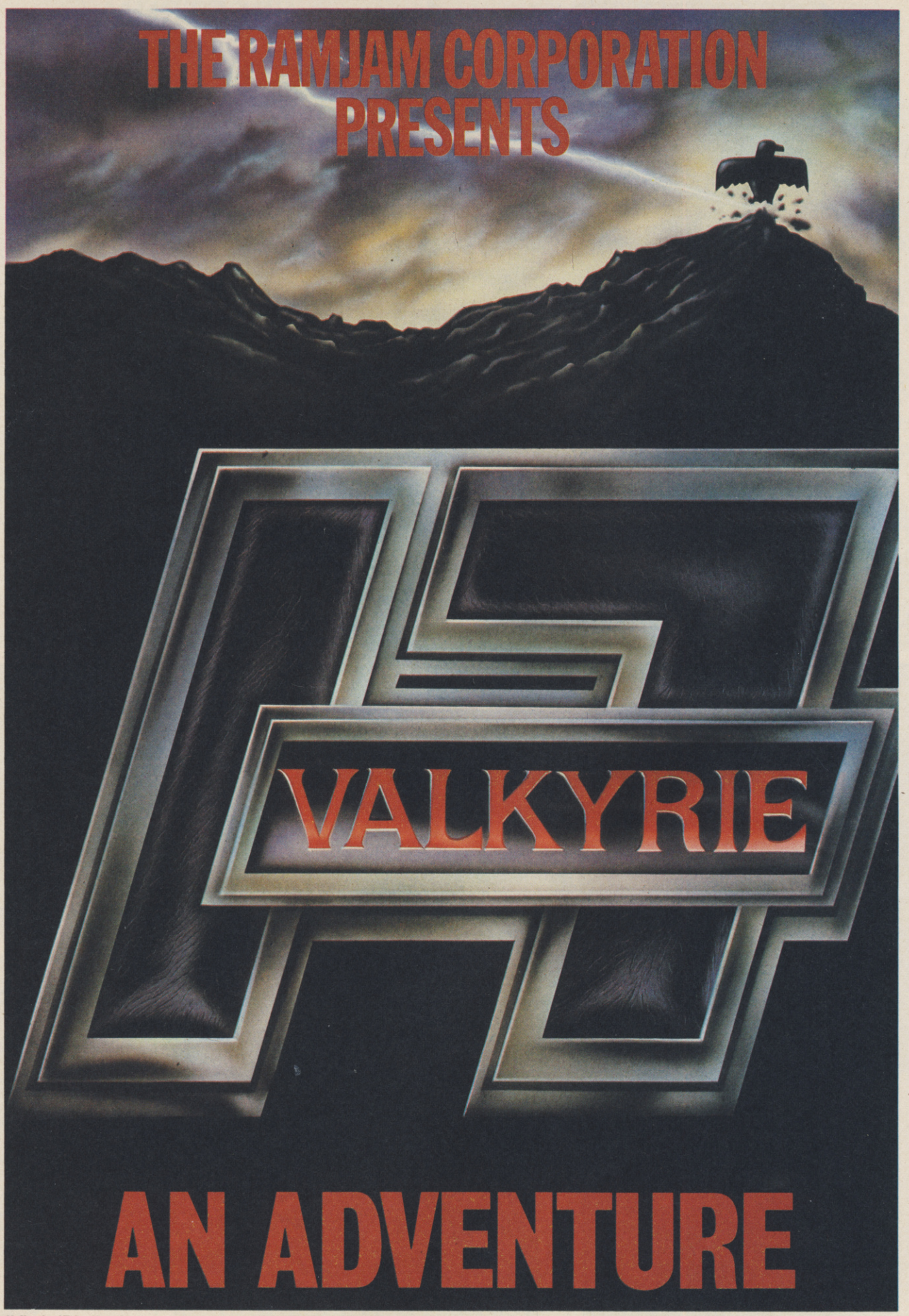

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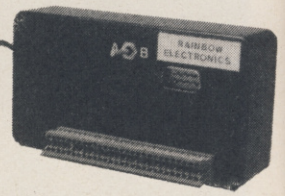

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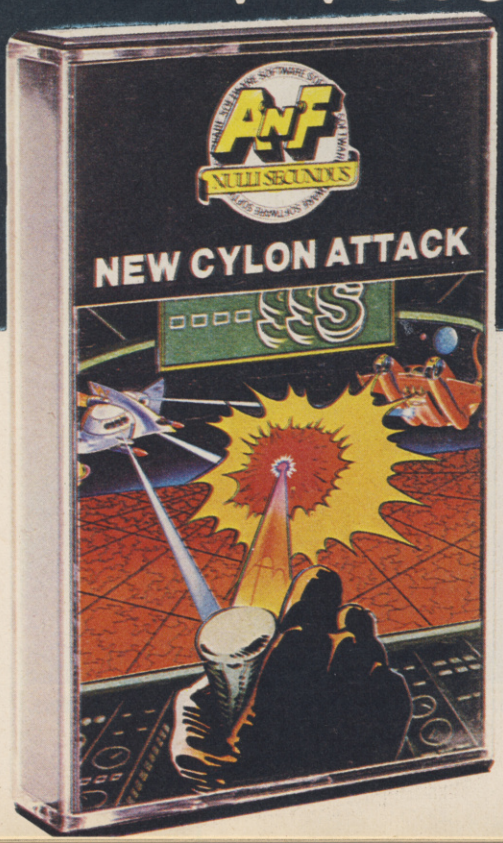

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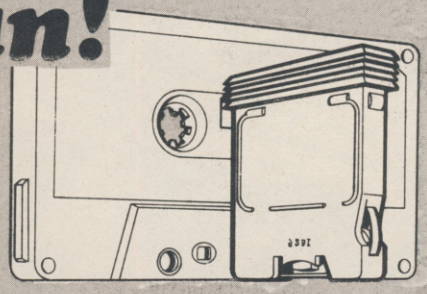

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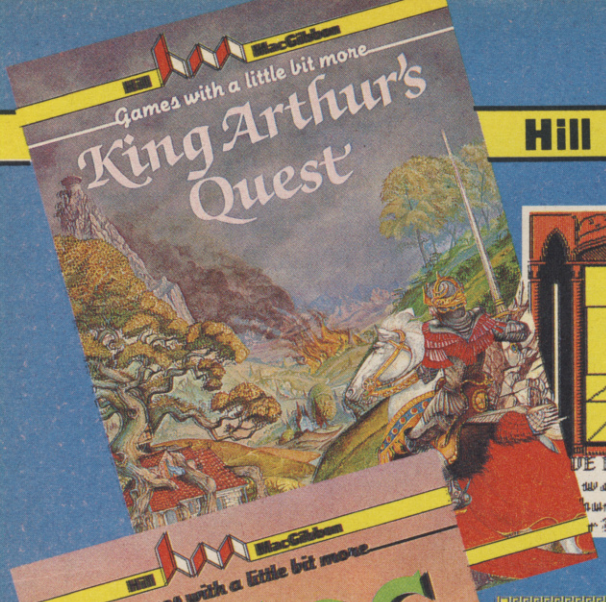

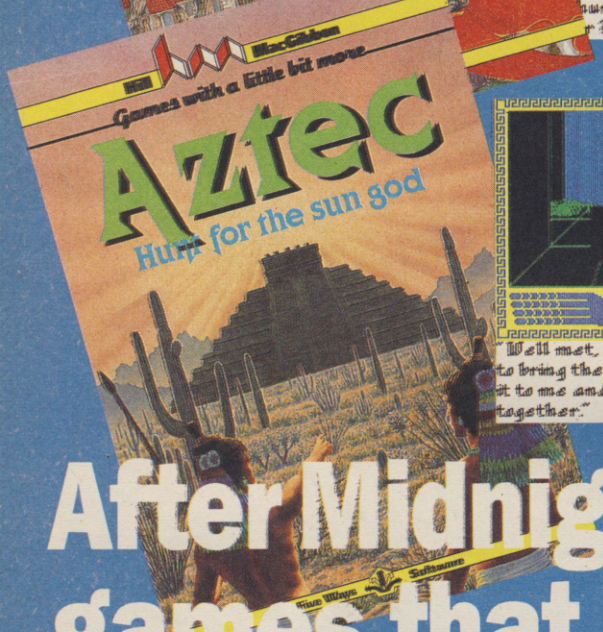

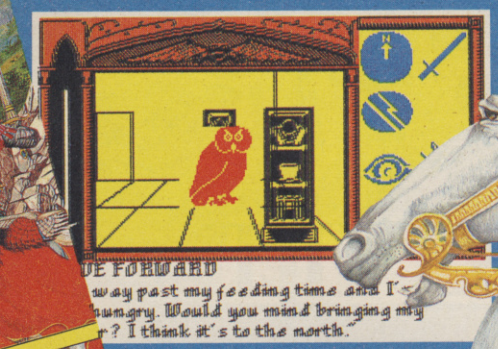

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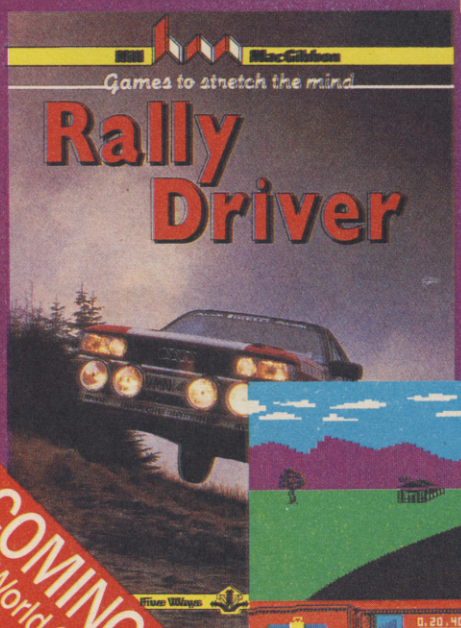

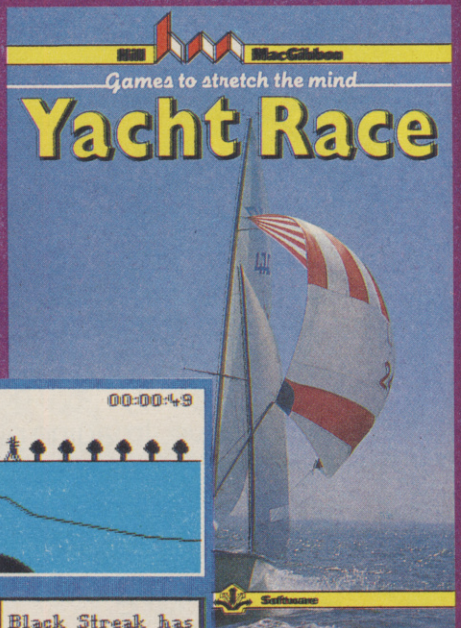

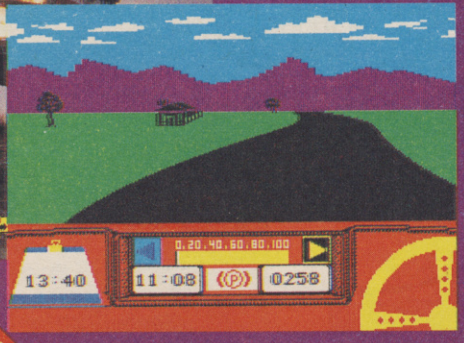

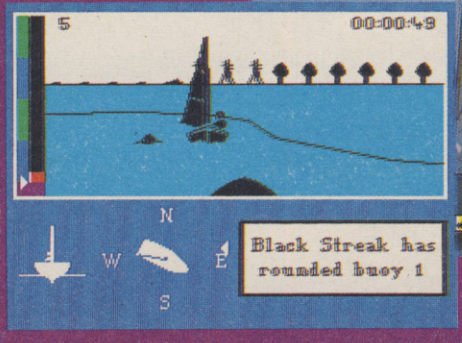

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Easy on Basics

THE REALLY Easy Guide To Home Computing, by Sue Beasley and Ruth Clark, adopts the discovery led method of learning. There are lots of cartoons and funnies interspersed throughout the text to aid the user, based on the characters of Mike and Rose and Inspector Key. Those characters at times can be a little overwhimsical which, in a way, detracts from the text.

It has to be asked, however, whether yet another book on learning Basic is necessary. Learning Basic at all is considered in some quarters to be inferior to learning Logo as a first programming language at nine plus. As *The Really Easy Guide to Home Computing* is aimed at that age-group, it would seem that it could be superfluous on two counts.

Theo Wood

THE REALLY EASY GUIDE TO HOME COMPUTING: THE ZX SPECTRUM
Century Publishing
Price: £6.95

Case of the Pascal puzzle

THE INFLUX of different versions of Pascal for the Spectrum and QL has certainly made the language more popular with microcomputer enthusiasts and a good book on the subject is essential. Surprisingly enough, one of the best books was written two years ago and creates a novel approach to the language.

Elementary Pascal, by Henry Ledgard and Andrew Singer, may seem an uninspired title for a book but the sub-title, Teach Yourself Pascal by solving the mysteries of Sherlock Holmes, gives some clue as to the tack that the authors follow.

After a brief preface in which an old manuscript containing some forgotten notes, written by that eminent GP Dr Watson, are discovered, the book launches into the first escapade involving Sherlock Holmes. He discovers the Analytical Engine, which we would call a computer, and shows Watson how it can be used by a criminologist to collate facts and render clues more helpful.

Holmes does not see it as a miracle machine which can solve cases but as something that will be useful in proving that his conclusions are correct. "Of most interest to me is that it will provide a way of expressing my logical methods in a rigorous form, and perhaps be useful in communicating to others my modest attempts at formulating a Science of Deduction".

Indeed it does. The explanations given by Holmes, followed by the notes of the authors, combine to produce an excellent, stimulating and amusing text which provides at least a basic grounding in the main Pascal sub-set common to all versions of the language.

The main section of the book is used by Watson to discuss four cases in which Holmes used the Analytical Engine. The first, Murder at the Metropolitan Club, deals with algorithms and shows how ideas for programs can be written down in the systematic way required by the Pascal programming language. Holmes finds the murderer by fitting clues together within a computer environment and then looping around the program instructions until one clue fits with another and the villain is found.

The remaining cases build on the knowledge of Pascal that the first gives. In the Adventure of the Bathing Machine, Holmes enters data about sea tides in order to find the time of a murder and trap a murderer; A Study in Cigar Ash shows how Holmes teaches Watson how to enter data into the Analytical Engine using Pascal and how that information can be accessed; and finally, The Adventure of Clergyman Peter finds Holmes trapping a religious thief with the aid of a train time table and the Analytical Engine.

Once the main body of the Pascal language has been introduced Holmes indulges in a series of three pipe problems. Those are simple cases which show how useful application programs can be written in Pascal. The programs grow more complex but the real authors of the book continue the notes with which they back up all of Holmes' cases. Those notes seem to be for people who have not followed the famous detective's thinking.

Despite its unorthodox approach, *Elementary Pascal* should help even the most accident prone potential programmer learn the language which is growing more popular all the time. The book's style is somewhat similar to that of Conan Doyle and Holmes is a reasonable counterfeit.

John Gilbert

ELEMENTARY PASCAL
Fontana
Price: £4.95

more books on page 133

Taking the QL to task

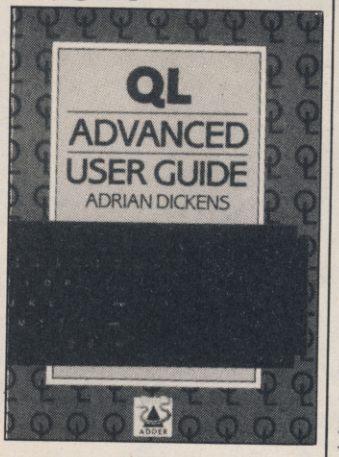
FEW PUBLISHERS have ever considered launching books about machine code on the QL or how to get the most from QDOS. While some have been capitalising on the power of the SuperBasic language others have just been worried whether the operating system will change or about how to treat the information.

Neither of these worries has hit Adder Publishing which has just launched *The Advanced QL User Guide* by Adrian Dickens. It contains just about everything that both software houses and the private individual require to launch into machine code programming.

When taking the first steps towards QDOS mastery the reader is introduced to a SuperBasic program called the Experimenter which will allow many of the 68008 registers to be changed. It also allows the beginner to see the results of QDOS routines, and how they will affect the running of the QL. Dickens suggests several experiments including suspending the operation of SuperBasic and printing a character on the screen.

The Experimenter is limited in its appeal but the author soon progresses into machine code manipulation of QDOS, giving a full list of QDOS utilities available and the traps required to invoke them.

Despite the sometimes convoluted style and the exorbitant price, *The Advanced QL User Guide* acts as an excellent reference book as well as a tutorial. It is a stepping stone into the heart of the QL.



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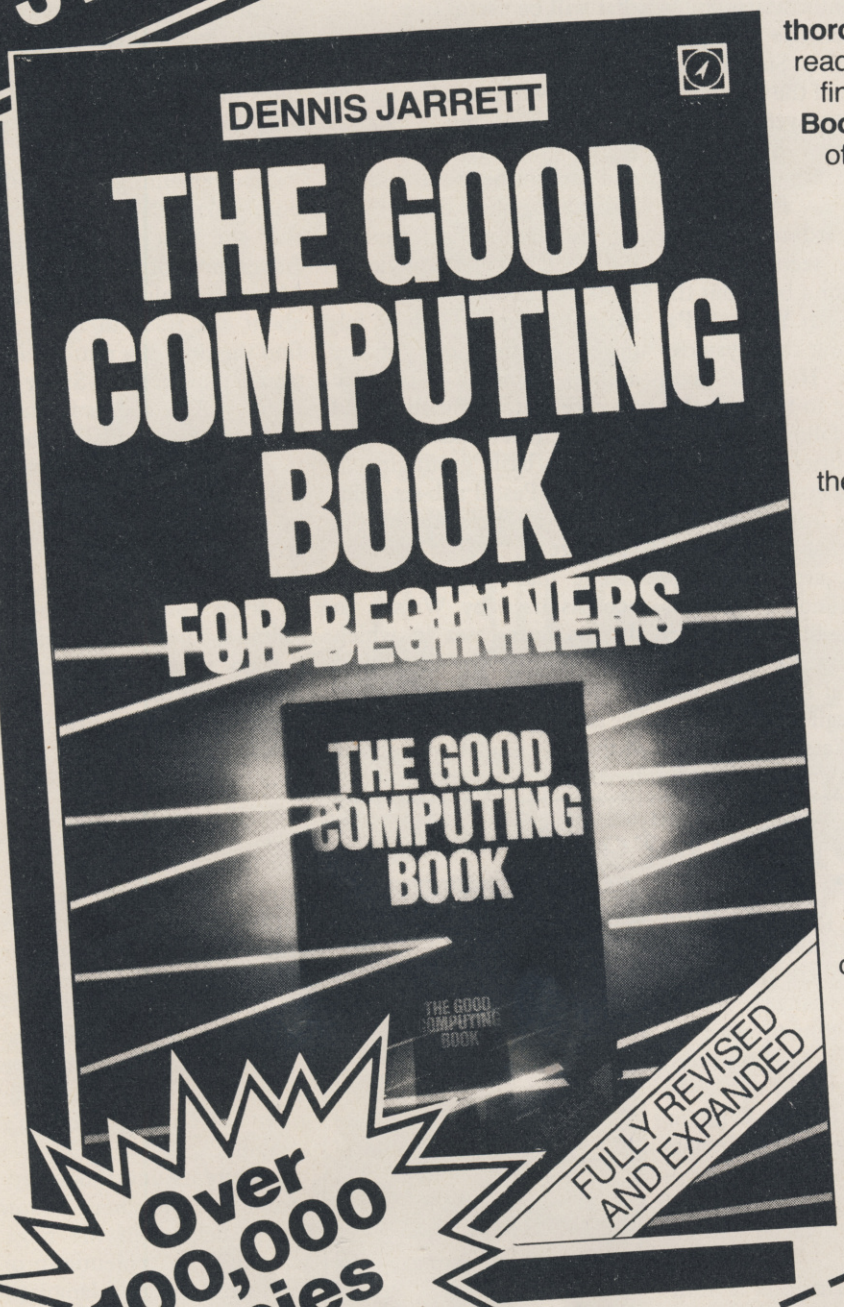

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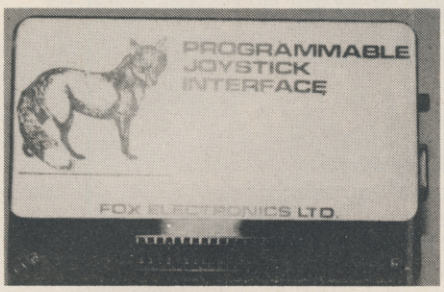

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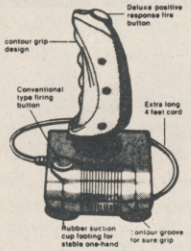
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Advice for hopeful software superstars

ANYONE caught giving away the trade secrets of an industry would normally be regarded with suspicion by co-workers in that field. The culprit in this case, A J Harding with his book *Writing Software For Profit,* is, however, likely to be blessed by colleagues in the software industry and amateur programmers who want to get their ideas into the shops.

The book, published by Virgin Books, not only shows how to approach the business side of the operation — going to software houses, writing specific application programs and dealing with income tax — but also describes the ideas behind the industry, which types of programs are likely to be accepted and how to go about writing them.

The advice given is that of a software publisher as Harding knows the business inside out. He has been in it six years as director of a software house.

The first section of the book describes the industry, how it has grown and the type of people who are involved in it. It covers mostly the upper, business, end of the market but the innovations shown by Tandy and Commodore are equally true of the smaller outfits attached to the home market.

Harding explains that professional authors write for chips and not for specific machines. In that way one program can be adapted for a wide variety of micros which contain the same chip. For instance, a game written for the 6502 could be easily run on the BBC Micro and the Commodore range of machines. A Z80 game could be transported across a wide variety of machines including Spectrum and Colour Genie.

The next section, choosing a subject, expands on the theme of machine popularity. Harding lists the types of programs which companies will accept and stresses that you should pick companies carefully.

Programs on the list include arcade, adventure, board, utility and simple account software. Each category has a section to itself in which the author explains the area and the pitfalls involved in it. He defines an adventure as a puzzle in which "certain actions have to be carried out in a chronological order". Harding goes on to explore some of the aspects which should be incorporated in adventures, such as syntax decoders, and how they have been used in famous programs such as those written by Scott Adams.

It is a change to find an author who talks about software writing as a business and not as an art form. His message is clear. Good software makes big bucks. Creativity is a consideration, but as in any other business money has to be a prime concern or you will be bankrupt before your first program has been accepted.

Harding's reasons for writing such a book, to help programmers get the most out of publishers when he runs such a company, might be regarded as suspect. The reverse is true, however, for two reasons. Publishers will welcome the book because it shows programmers what a company requires for a quick turnover of material. Gone will be the days of endless dross sent through the post on bad-quality tape or as listings.

For the programmer the book provides all the answers. It might deter some from writing software but those are likely to be the ones who demand attention for their masterpieces which are sent in as miles of computer printer listing. As the book says, computers mean business.

John Gilbert

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WHEN the QL sales finally take off there will no doubt be people buying the machine who have no previous experience with computers. For that reason the two books *QL Quill* and *QL Easel* are a comprehensive guide to their operation.

QL Quill was written by Clare Spottiswoode and Francesca Simon. The former has had a great deal of experience with both mainframes and micros. Francesca Simon, as arts journalist for the *Sunday Times,* has expertise in writing for a non-computerate audience.

It is that combination which is responsible for the jargon-free nature of the book, which takes you step by step through the operation of Quill, the word processing program for the QL. The book is well laid out with ample explanation of each new concept. Besides that each new task is tied in to the story of Harold and Joyce Blake, their daughter Miranda, and her besotted admirer Nigel Wooton. Cartoons,

from Derek Alder of the *Sunday Times* liven up the text. Whether you like or loath the family concerned, the tales of Harold, a soft toy manufacturer, and Joyce, setting up her jewellery business, provide adequate examples of the uses of Quill in a business.

The book not only teaches you how to use the program, but also contains a great deal of sound business advice. An example of that is Joyce's action plan for Jada Jewellery which contains all the necessary ingredients for preliminary action before starting a new trading venture.

One tiny quibble comes at the beginning, when you are warned "Don't ever plug in a monitor when the computer is switched on, or you could blow your system." That is not in bold characters but lost in the text which preambles setting up the computer.

There is also an error in the instructions for Search and Replace. If you follow the book the procedure does not work; simply follow the screen instructions instead.

QL Easel, written by Alison Spottiswoode, who is as well qualified as her sister in the micro field, is written in a similar vein. There are more examples based on Harold and Joyce. The power of the program is readily accessible, and by illustrating that power the author has made it extremely easy for the business user to understand the usefulness of graphic interpretations of business figures.

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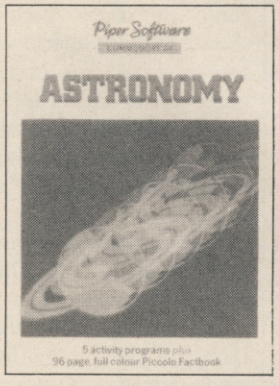

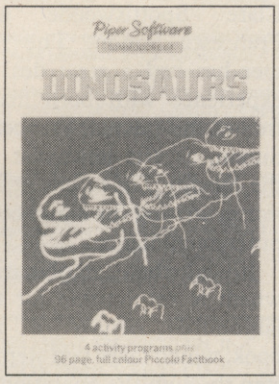

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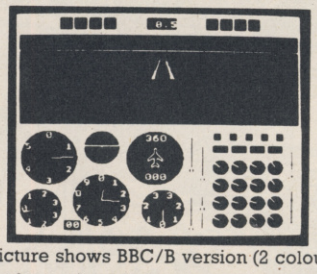

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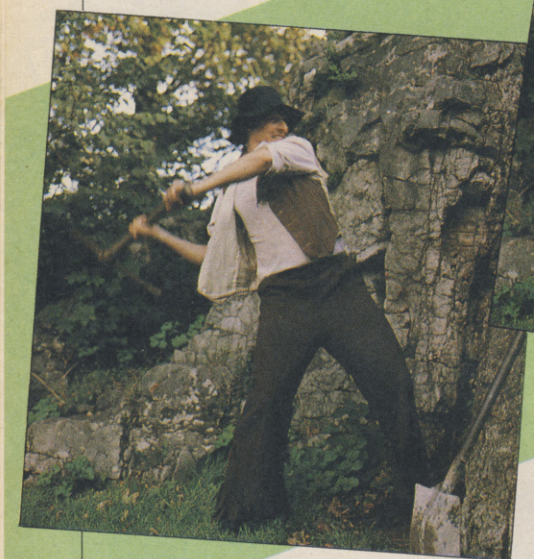
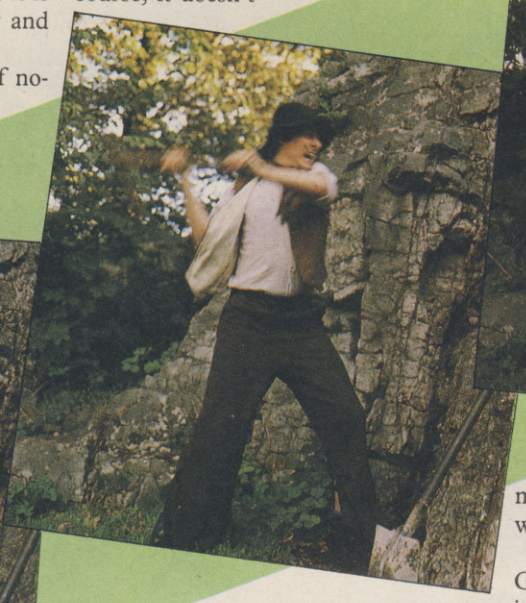
Fools' gold from the funny farm?

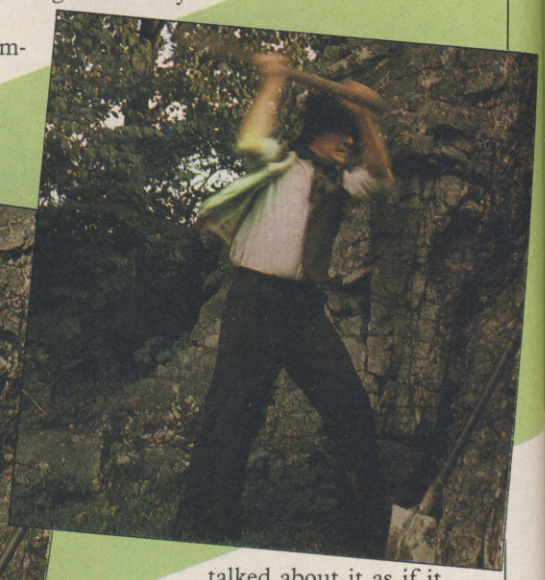
Chris Bourne digs into the past of ZX-81 specialist, Julian Chappell

MAKING a living out of the ZX-81 seems an odd thing to attempt in times when most software houses treat the machine as if it were carrying typhoid bacteria. Some retailers would prefer to see a rabid dog on their premises than a ZX-81 game. But such has been the success of Julian Chappell's Software Farm that not only is the company a going concern but it is even planning to expand into new and bigger offices.

Julian was born in Hounslow of nomadic parents in 1956. "My father was an oil depot manager, so we kept moving to new depots.







Eventually he retired to Weston-super-Mare and ran a sub-post office. I started work behind the counter when I was eighteen."

Julian had an older brother, Paul, who was an electronics graduate. Paul was setting up his own business constructing control devices for industrial processes. Julian was dragooned into learning machine-code programming in order to help write the routines to control the chips.

"Eventually we went high-falutin' and did a control system for the local nuclear power station. Unfortunately we couldn't throw it into critical to test the system. I don't know whether they used it in the end."

Before you heave a sigh of relief at the thought that nuclear devastation may after all not be under the control of the undoubtedly zany Julian, it is certainly true that a British Steel blast furnace is being monitored by bits of an old ZX-81, courtesy of the Chappell brothers.

"It provides a printout of the temperature," says Julian, "monitoring safety levels. Of course, it doesn't look like a ZX-81. We put it in a fancy box to make sure of that."

Machine-code expertise came haphazardly. "Paul would say, 'I've got this cheap chip we could bung in it' and half the time I had to hunt through the libraries for a list of mnemonics to program it. Sometimes there were only two registers and an accumulator."

Eventually the brothers fell out. "I wanted to do something on my own," Julian admits. "The business was unsteady, so I left him to go bust on his own. It was all very friendly."

Having drifted almost by chance into the world of micro-electronics, Julian had already acquired a ZX-81 of his own. "I was mildly interested in the ZX-80," he says, "but it was almost as crude as what I was doing myself at the time. Only nutcases had ZX-80s. When the '81 came out I thought I'd find out about this wonderful Basic language."

His first impression of wonderful Basic was that it was painfully slow, even when number-crunching. He wrote some games for it in code, a Pacman and Asteroids game, which were later marketed as **Asteroids** and **Gobblers.**

"I wrote them for fun. It was a busman's holiday really. Then I bought *Sinclair User* and saw that only about 10 per cent of the ads were for machine-code games. They talked about it as if it was something amazing and mysterious. I realised that I might as well jump on the bandwagon."

Together with his girlfriend Sarah Green, Julian took out a quarter-page ad in *Sinclair User* and began to sell his games. The two of them worked from a back bedroom, saving the games directly from the machine and doing the labels themselves. Sarah herself is far from being just a convenient envelope-licker, but a business programmer in her own right, having written for the Sirius, Apricot, "and IBM, yeuckk!"

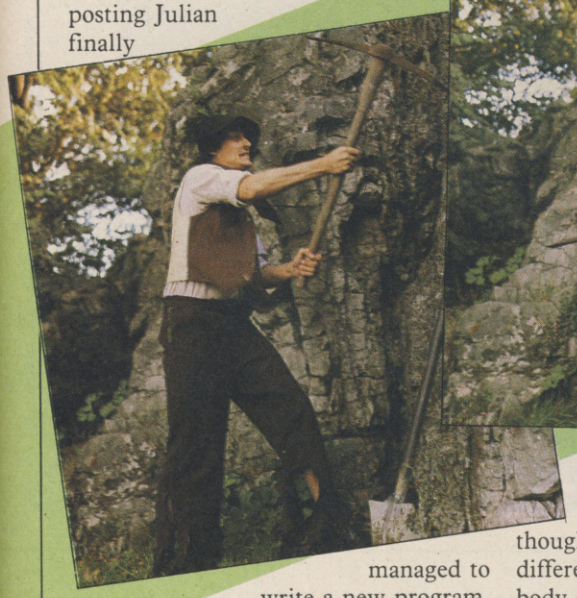
"The response kept us up at night," Julian continues, "and we started making money. The problem, which still exists, was that the business side interferes with programming time."

Thus the Software Farm was born. Julian's parents had left the post office by now and had bought a small farm in South Wales, which became the business address, as Julian and Sarah were living in rented accommodation and

could not use it commercially.

"We were aware of the general attitude of fear towards computers, particularly among older people, so we thought calling the company a farm might help them relate to us. Originally we had a vegetable Pacman but eventually we decided on the cosmic cockerel."

In between long bouts of duplicating and letter-posting Julian finally



Photographs — Mike McKnight

managed to write a new program, **Super-Scramble.** Instead of the usual missiles and neutron bombs Julian used bats and a witch at the end.

"It has very imaginative graphics even though they are not hi-res," interjects Sarah, supportively. The game was released for Christmas 1982 but the manual duplicating was becoming a major problem.

"At that time all the support agencies were in their infancy," says Julian, "but then we started getting information through the post. It was a godsend to us, even though it was still tape-to-tape. Only now, and only with big companies, can you get loop bin duplication systems."

Julian and Sarah took Super-Scramble to the very first ZX-Microfair just in time to see Spectrum fever hit the trade.

"We were deserted," says Julian. "We sold enough to break even, but it was a great disappointment. We made no trade contacts. Everyone wanted Spectrum games, and that has continued ever since."

Being left out in the cold did, however, give Julian a different perspective on what was happening. "We could see everybody was going bonkers. The software was all rubbish, with ten new companies a day. It was blatantly obvious that the market was flooded from day one."

Eventually Software Farm decided what few software companies dared to consider: to remain with the ZX-81 in spite of the new machine.

"Although everyone was going stir-crazy, all those ZX-81s were not going to evaporate. We thought, let's do something clever and different with it. With any luck everybody else will leave us with the ZX-81 on our own."

For six months Software Farm lived off the dwindling profits from the original games, while Julian set himself to work out how to turn the ZX-81 screen into high resolution.

"It took six months to develop the system and three months to write the first program, **Forty Niner.** All the while the money was getting less. There was a sense of risk. If we had it wrong and the ZX-81s really were gathering dust then we would go bust."

The crunch came at the *Your Computer* Christmas Fair in 1983. At that time, the company was at rock-bottom. Forty Niner was launched, and took off. The gamble had worked.

Forty Niner was designed as a showpiece for the new graphics which give the same resolution as on the Spectrum. It is a digging game in which you must persuade the snakes to eat the giant rats or some such nonsense. Julian hit on the idea of projecting it as the first in a series of hi-res games, each one of which is to be on a distinct theme.

"It's like free wotsits in cornflakes packets," says Julian. "If you get one then you want the whole set."

The second game, **Rocket Man,** is a levels and ladders game in which you must collect diamonds while avoiding the man eating bubloid. If you get past the third level you become a vulture and must eat legs of lamb to keep your strength up.

Selling the games to retailers was difficult.

"You could hear the voice at the other end of the phone drop as soon as they realised it was a ZX-81 game" says Julian. "We had to offer them sale or return terms, but once the media was on our side it changed. Now they keep badgering us for more."

The new game will be called **Z-Xtricator,** and will be of the **Defender** type. "It's not a vehicle for the graphics, otherwise we would have done it first. We are also going to do a hi-res utility so people can design their own games."

Z-Xtricator is not intended to be the last in the Software Farm hi-res series, but one thing you should not expect is any form of adventure game. Julian hates them.

"Normal adventures bore me to tears. You are in a dark hole. Something ferocious is approaching. Then you wait for twenty minutes while nothing happens . . . On the other hand, I have a hankering for a truly animated adventure, not a pretend one. If we did it, it would probably have to be on the Spectrum. The Software Farm," he adds, portentiously, "being innovatory, will do it properly."

Sarah is anxious to dispel ideas that a Spectrum game would mean leaving the ZX-81. "Every letter we get says keep up the good work. We got one cute one which said the writer had written to *Jim'll Fix It* because he wanted to meet Julian."

Software Farm is certainly proud of its following. 'As long as consumers continue to buy the product we are not

continued on page 142

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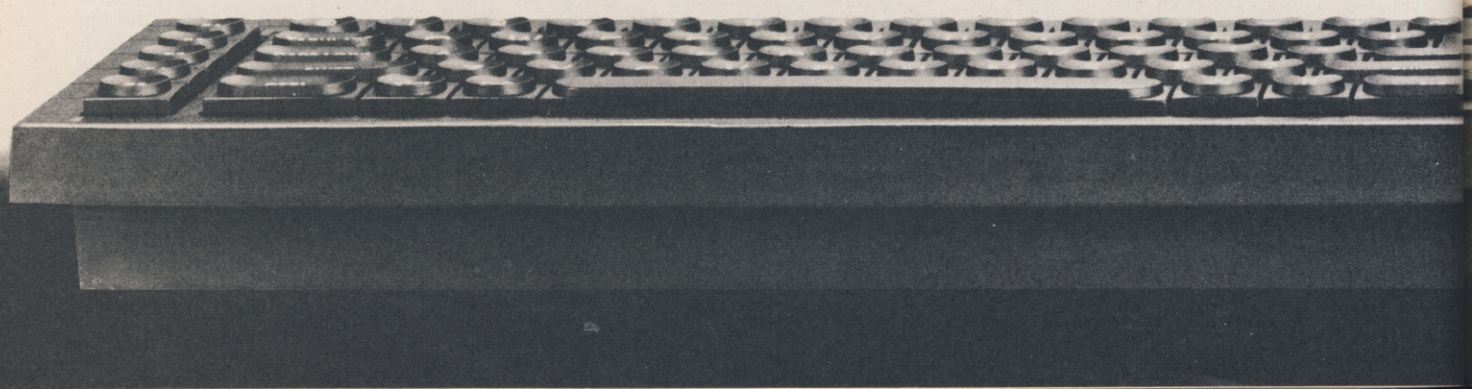

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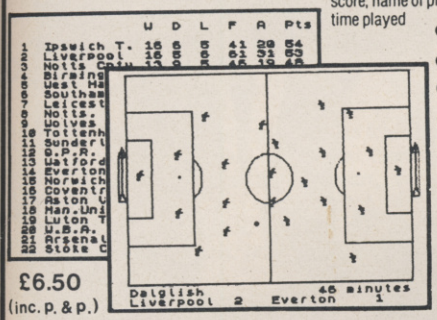

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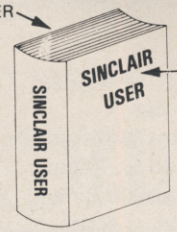

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continued from page 139

going to drop the ZX-81," says Julian. "We'd get lynched if we did."

The company even runs a software club for enthusiasts with a regular newsletter containing letters, hints and tips, program listings and a series of articles by Julian on machine-code.

Perhaps it is the company's recognition of the importance of maintaining a loyal and friendly customer base which ensures its success more than anything else. Selling a ZX-81 game is quite a different proposition from selling for the Spectrum.

"All the support industries base prices on what the source industry can afford," says Julian, "which means Spectrum prices. A ZX-81 program has to be a hit or it won't make any money at all."

The problem is simply that although ZX-81 games tend to be cheaper than Spectrum games in the shops, because the ZX-81 itself is cheaper, the cassettes, labels, duplication and so on all cost just as much, so the profit margins are much lower. Unfortunately many of the enthusiastic programmers who send material to Software Farm do not realise that fact.

"Out of the thousands we are sent lots are no good and many are just not commercial propositions", Julian explains. "The rest have ideas based on the Spectrum market. But you won't get £40,000 for a Spectrum game, yet they think they can make that on the ZX-81. A hit is vital, and even then it is not big money. Then they think they are being ripped off."

With the hi-res series of games, Julian and Sarah appear to have got the business about right. Rocket Man reached 28 in a Gallup survey of top games, which is extraordinary for a market dominated by the Spectrum and Commodore 64. But determination and nerve have been as much a factor in their success as excellence of programming or games design.

Perhaps a clue to Julian's character can be found in his hobby, an esoteric form of karate known as Tang Soo Do, which is concerned with demolishing opponents wearing full body armour—with your bare hands. "Our instructor is the World Champion of All Martial Arts" says Julian. Apparently the man has beaten judo, kung-fu, and karate experts into the ground with his skills. "If you turn up late for a class, you have to spar with him," Julian grimaces.

It certainly sounds like good preparation for taking on the equally well-armoured hordes of Spectrum games producers, and winning shelf space and ratings up there with the best of them. One thing is for sure—there is no room for turkeys on Julian's farm.

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Utilising Hardware Programmed technology you have the benefit of automatic eight direction control, no power-down programming loss, guaranteed conflict-free operation with other peripherals, including microdrives, and no extra software to load or awkward joystick movements and key presses to make each time you load another game. The keyboard remains fully operative at all times.

It is also perfectly possible to connect up to five Protocol 4's on one Spectrum, each programmed separately, for multiple player control — only possible with the hardware programmed design.

Incorporated into the design is a computer Reset button for clearing the computer memory between games without pulling the power plug out.

Fully guaranteed for 18 months, Protocol 4 comes supplied with five CustomCards, ten Quick Reference Programming Cards and complete instructions.

PROGRAMMABLE INTERFACE

As the first fully hardware programmed joystick interface, this product has become well established over the past year and will accept ALL standard joysticks or trackballs, including Quickshot II with 'rapid fire', for use with ALL Spectrum or ZX81 software — not just those with a joystick option.

* No Software programming required.
* Programming is *not* lost when power is disconnected between games.
* Eight way movement — with or without the fire button pressed — only requires setting of the four normal directions.
* Compatibility is guaranteed with ALL key reading techniques — machine code or BASIC.
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The AGF Interface II represents the best low cost introduction to joystick control.

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Any game which is controlled by the cursor movement keys (5,6,7,8) or has a Protek option is also compatible with Interface II.

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This product is available for either the Spectrum or ZX81, is supplied with full instructions, a 12 month guarantee, and a 12½% discount voucher against further AGF mail-order purchases.

ROMSLOT

The new AGF RomSlot is designed for anyone who already owns a programmable joystick interface, or prefers to use the keyboard to control games, and would like to add the facility of ROM cartridge software to their system.

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SINCLAIR USER JUNE 1984

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This is one of the best database programs available for the ZX Spectrum. This program has many uses in a small business.

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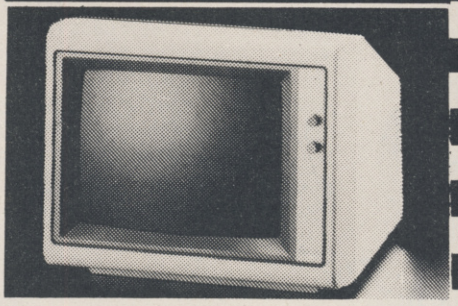

It is possible to connect your Spectrum to both Black/Green and composite Video monitors using high resolution monitors are particularly useful with programs like Tasword that use 64 columns. We supply complete instructions on how to connect monitors to both Issue Two and Issue Three Spectrums. These monitors can also be connected to your QL.

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BARCLAYCARD VISA

Contents

More from our postbag below, and on page 150 Mike Wright takes a look at new improved versions of old software.

SINCLAIR BUSINESS USER

January 1985

Excommunicated!

I TENDED to feel, at first, that Mr Simmonds — October — was a little harsh when speaking of **Vu-Calc.** In practice, however, the program is little more than an unmitigated disaster.

The program can be difficult to load, often will not respond to commands, frequently crashes and inevitably loses all one's hard won data.

I use the program in connection with the local church accounts and I dare not lose any more data or the Vicar will excommunicate me.

For my part, the theoretical facilities are adequate but the appalling unreliability and continual loss of data even in a simple spread-sheet have rendered the program unusable and caused me a lot of embarrassment. It is far safer to do things the old, hard way by hand and, strangely, it is much faster.

Can anyone tell me is Omnicalc is any more reliable? I don't care about extra facilities.

W L Simpson,
Wimborne,
Dorset.

Proportional spacing

REFERRING to your answer to Charles Lane, *Sinclair Business User* November 1984, as I understand it the term 'proportional spacing' has now come to mean one of two things: (i) words can be moved to square up lines of text so that there are equal gaps measured in units of less than one character space; (ii) it is possible to specify exactly how much space is to appear between each letter i.e. an 'm' will take more space than an 'i'.

I have been using a Juki 6100 Daisywheel printer, with **Tasword 2** as the word processor program. That printer supports proportional spacing of type (ii) above. I wish to print, as Mr Lane, justified right hand edge proportional print — to look the same in your magazine — but as yet I have not found any program which will do it using the Spectrum.

Dr R M Megit,
Hastings, Sussex.

Transform warning

FIRST, congratulations on an ever-improving magazine. Looking over back issues it certainly would appear that your editorial staff do take note of valid criticism — and the result is less trivia, more interest, in your letters pages.

Next, a warning to potential purchasors of the professional keyboard from Transform. I recently ordered one. It didn't work at all. To the company's credit they sent a replacement PCB and connectors by return.

However, having tested the keyboard for response, I then assembled it; loading from tape was all right but programs crashed on running, the UDGs were corrupted, and other lines.

Microdrive loading was even worse. Apart from program corrupton, the machine commands — SAVE and MERGE — were interfered with, and the microdrive would not stop.

Transform is obviously aware of those problems, as enclosed with the keyboard is a letter admitting that, offering an add-on buffer at £6.95.

If the problem is so well known, why isn't the original board modified to include the buffer?

L S Delby, Shefford,
Bedfordshire.

Software in the toolroom

I OWN a 48K Spectrum, and I wish to know if there is a software house which produces a program on the skills of carpentry and joinery.

J Mitchell,
9 Clive Avenue,
Crayford, Kent.

Shop Window

SHOP WINDOW enables you to publish details of programs with limited markets once only in Sinclair Business User, *at no charge. If readers would like details to appear regularly they can advertise in Sinclair Supermart.*

Mozart. Three 48K programs giving details of the Köchel catalogue of Mozart's music. Program 1) deals with the complete catalogue, and programs 2) and 3) with instrumental and vocal music respectively. Each costs £5 from John Halsall, 18 St Michael's Close, Exeter EX2 8XH.

Cub Pack Record. A record system for Cub Scout Leaders, with analyses, promotion and proficiency tables. 48K Spectrum. Roger Missing, 16 Kedlestan Drive, Orpington, Kent BR5 2DR. Price £5.

Hair Defenders. Program 1 deals with knowledge of hairdressing, programs 2 and 3 with scientific aspects of hair care. 48K or 16K. John Lyons, 6 Queens Road, Camberley, Surrey, GU15 3AN. £5.75 or £15.00 the set.

Organic Chemistry. Draws ring-containing structural formulae, from simple compounds to steroids and antibiotics. Handles heteroatoms, stereochemistry, bond types, and substituent groups. 48K. M Davis, Dept of Chemistry, La Trobe University, Bundoora, Vic, Australia 3083.

Survey II. Analyses questionnaire data. Generates full frequency distributions, histograms, cross tabulations, chi-square statistics. 48K Spectrum, from Lobos Software, 10 Randall Place, Bradford BD9 4AE. Price £10.00.

Curtain Estimator and Receipt Printer. 16/48K. Calculates all curtain requirements from bare window measurements, and prints a receipt of details. Plushscale Ltd, 14-16 Little Walk, Harlow, Essex CM20 1HY. £24.99.

Track down share-outs

Mike Wright finds how to keep stock of your shares

AT THE TIME of writing a major advertising campaign is being run to persuade as many ordinary people — in other words, you and I — as possible to buy British Telecom shares and so start dabbling in the stock market. For those of you who have got your feet wet in the sea of shares ownership **VA£TRACK 2** from Morley Davies Associates may be of some interest.

It is a share portfolio management system for use by chartists — those who believe that share price movements reflect the relevant information and that the analysis of those movements leads to correct decisions on buying and selling. The original version was developed for the ZX-81 but was never made commercially available.

VA£TRACK 2 is supplied with a 22-page manual which tries to explain not only how to use the program but also something of the philosophy of buying and selling shares. It is one of the best written and easiest to read you are likely to come across. The program is recorded on both sides of the cassette with a file of dummy records also recorded on the first side. It is loaded using the command CLEAR 64500: LOAD " ".

The basis of VA£TRACK 2 is a list of weekly share or index prices over the last half year and that your portfolio comprises shares from some of those. Share values should be updated weekly from the Saturday edition of the *Financial Times* and that copies of the last 26 weeks' issues are kept in case you need to add data for other shares. Alternatively, Morley Davies will supply additional history tapes which give 26 weeks' prices for specified shares.

The program has facilities for listing the records to the screen or printer, adding new records either manually or from additional history tapes, doing a weekly or an interim update of share prices, valuing your portfolio as well as loading and saving files. Options are also available for generating test records or examining the postures, or trends, of all or part of the records.

Five postures are used based on comparisons of the five and thirteen week moving averages and last week's price. The large amount of calculation necessary for posture tracking makes the process painfully slow. The manual recommends that you make a cup of coffee afer selecting this option but a three course meal may be nearer the mark for a large number of records.

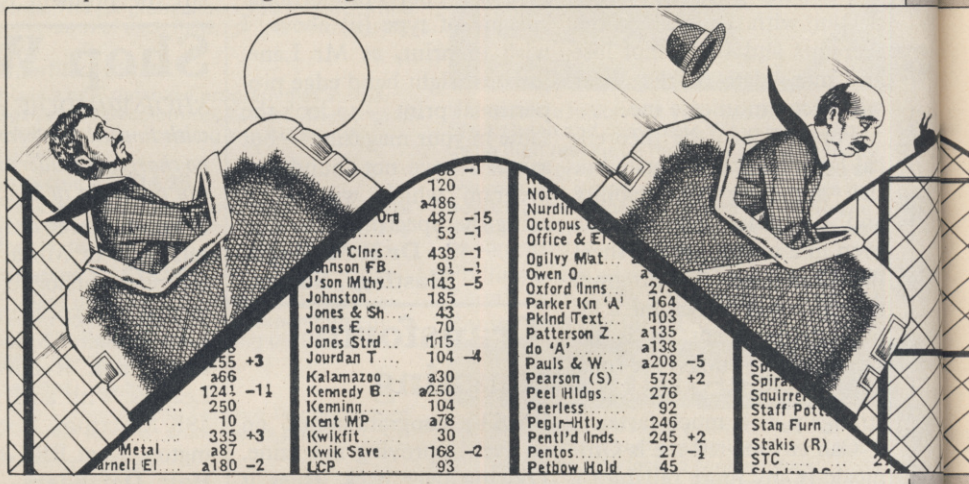
Individual records can be put under the microscope by selecting option 0 from the main menu. After entering the record number a subsidiary ten option menu is provided that lets you analyse the last 13 weeks' data in either raw (unadjusted) or adjusted (price changes are smoothed by reducing all movements to less than 10 per cent) form. In both cases five and 13 week arithmetic and exponential moving averages are displayed together with the posture and the slope of the last five weeks' prices. A range of graphs showing the raw or adjusted data, the slope or a comparison with another share or index, can also be produced.

Reading the manual makes you very aware of the time and effort involved in using VA£TRACK 2. The suggestion of keeping 26 week's copies of the *Financial Tiimes* is frightening (aren't computers supposed to cut down paperwork?), and the thought of spending an hour and a quarter entering details of a mere 20 shares or even fifty minutes on a weekly update of 200 shares may fill you with horror (aren't computers supposed to save time?). However it is difficult to see how those operations can be shortened unless it is by the use of an optical character reader or modem and bulletin board.

The posture tracking takes an age to complete but to say it is slow does not take into account the large number of calculations involved or the time it would take to do it by hand.

One very pleasant surprise was the way in which you are protected from yourself. Selecting an option from a menu requires only one key stroke and invalid options are ignored. Typing errors which in most programs would be fatal, such as entering characters when the program is expecting numbers, either result in being asked to input again or jumping to the date screen at the start of the program. It would be nice if some of the larger software houses paid the same attention to detail.

VA£TRACK 2 is most definitely for use by the dedicated stock exchange dabbler — others are likely to find the amount of work necessary to get a return an inconvenience. If you are considering it then remember it is only a tool — the interpretation of results and the decisions made on them are yours alone.



Morley Davies say that VA£TRACK 3 should be available on microdrive or cassette and will apparently be cheaper. It will also feature more analysis and will cope with selling shares not owned. In order to include the extra features the maximum file size will be reduced from 200 records.

Morley Davies Associates, 11 Denham Lane, Chalfont St Peter, Bucks SL9 0ER

VA£TRACK 2
Memory: **48K**
Price: **£48.75**
Gilbert Factor: **7**

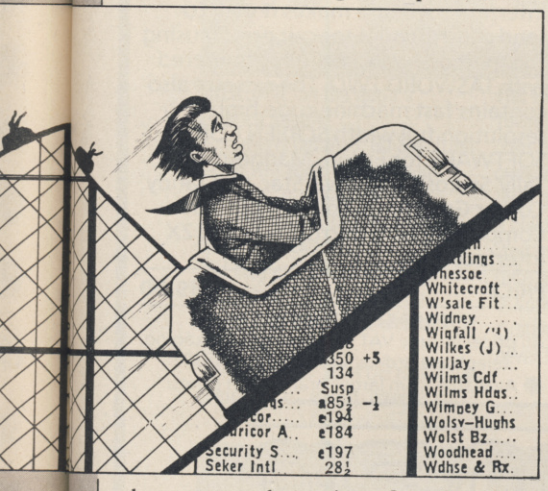
Something old, something new

A survey of extras

UNLIKE GAMES software which, in general, achieves volume sales rapidly before virtually disappearing, applications software tends to sell steadily and have a much longer life. Many applications programs are developed and improved during their life. With the *Sinclair Business User* section just over a year old it is a good time to look at the updates to some of the programs we have reviewed.

The very first review in December 1983 was of the OCP **Finance Manager** for the 48K Spectrum. That has been upgraded to include microdrive compatibility, allowing both the program and data to be saved separately to face. That set up routine is only used when loading from the original tape.

Saving the program — to tape or microdrive — also saves the printer interface codes to give a personalised



the program the option of cataloguing a cartridge is not included.

The +80 version of the program, for use with full-sized printers, has had a further refinement added. Previously the program could only be used if you had the Kempston Centronics interface, now it has been programmed to offer a choice of 15 different interfaces — ten Centronics and five RS232 — or to set up the codes for any other printer interany microdrive attached. The program is supplied on casette and still includes a facility for saving to tape. Although the program can now be run from microdrive and data files loaded within version for subsequent use. The printout for the +80 version shows the date of transaction, the account, the details, separate columns for debit and credit and the balance. That compares with the date, account, amount and balance on the ordinary version.

OCP has upgraded its other programs in the same way. According to Francis Ainley the good news for QL owners is that he is working on an enhanced program allowing a class heading, in addition to the account and description, to be used with the transaction. The program is likely to feature some sort of windowing.

Upgrading to microdrive compatibility was not possible with the Transform **Sales/Purchase Ledger/Invoicing** package as it was designed to run using twin microdrives anyway. Instead, improvements have been made to the Accounting program. Previously it was only possible to produce an overall total figure for all, or some, of the accounts by loading each account separately, noting totals and adding them up. Now a series of extra menus allows the list of accounts to be displayed and any combination of those to be selected and totalled. Accounts can be erased from a cartridge as another option. The package was reviewed in the November issue.

The Kemp **Stock Control** program was reviewed in the August issue and version 3.0 has been released recently. Like any other programs which have been improved Stock Control is now microdrive compatible but the improvements do not end there. It now has the option of selecting a full-sized printer and a 64-column printout.

If a full-sized printer is to be used and your printer interface needs software to drive the printer then that must be loaded each time before the program. The option of a full-sized printer must also be made every time. Although the resulting printouts are more widely spaced they are no more informative than those on the ZX printer.

Other improvements include making the length of the stock numbers and descriptions user definable. The stock number can be up to ten characters long while the stock description, previously 20 characters, can now be set at any length between 4 and 30 characters. Of course, the more characters used for those fields the less room there will be for the records.

Another improvement now allows up to two decimal places to be used for stock quantities. With those improvements this is now the most flexible stock control program available on the Spectrum.

It is difficult to imagine many improvements which could be made to **Tasword II,** the word processing program from Tasman Software. Instead, Tasman has released its equivalent of Wordstar's Mailmerge program called **Tasmerge.** The program is designed to operate with Tasword II and the Campbell Systems **Masterfile** and allows you to insert names and addresses from a Masterfile database into a standard document produced using Tasword II.

Now that it has a mailmerge facility Tasword II is once again streets ahead of its nearest rival, although the Softek word processor for the Wafadrive will be a strong contender if rumours of a database and a mailmerge facility are true. With Tasword II and Masterfile included as part of the microdrive/interface 1 Expansion Pack Tasmerge has a whole new market.

Speaking of Masterfile, that has been improved since it was reviewed last February. The latest version — version nine — comes in a smart plastic case and now includes MF Print which allows Masterfile to print to full-sized printers. That is done by allowing the user to set up and save the outline report exactly as it is to be printed. The blank report must then be loaded before printing out the selected records.

Unlike the ordinary report formats for the ZX printer only one report can be held in memory at one time. Others must be loaded when needed. In addition numeric data can be printed in a variety of formats including integer, two decimal places, with commas showing thousands and prefixing any character such as a currency sign. With those improvements the best database for the Spectrum is now even better.

Mike Wright

Campbell Systems, 15 Rous Road, Buckhurst Hill, Essex IG9 6BL.
Kemp Ltd, 43 Muswell Hill, London N10 3PN.
OCP Ltd, 4 High Street, Chalfont St Peter, Buckinghamshire SL9 9QB.
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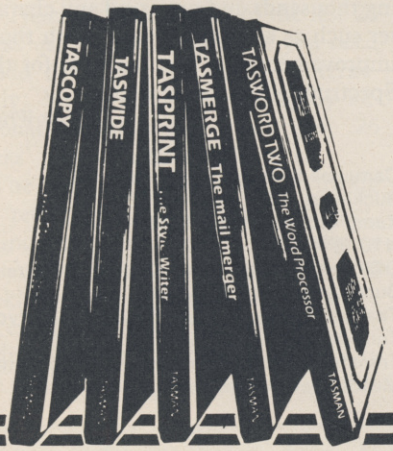

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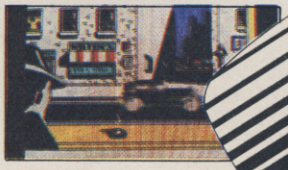

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Pat on back for Longman

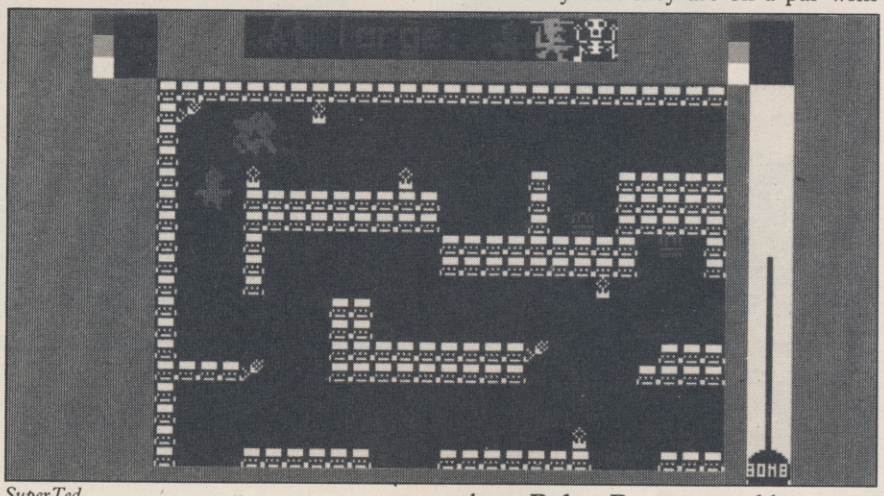
Theodora Wood assesses a new range of software

WITH THE plethora of learning programs available for use in the home, it is difficult for the prospective buyer to sort the wheat from the chaff. Comparisons are odious, but can be very useful as a guide. The recently released range of programs from Longman can serve as a yardstick to measure the value of some offerings in this field. The Longman Group having published educational texts for many years brings a wealth of experience to software publishing.

Software aimed at the under-11 age group, has to provide a certain degree of entertainment. Programs with a major undisguised element of sustained skill learning are unlikely to be popular with children at home.

The Mr T range of programs from Ebury software, under the *Good Housekeeping* label, was a minor breakthrough in early learning. The programs covered numbers, shapes, measuring and the alphabet, all superbly presented in the form of games designed to appeal to the pre-school age group. They provided good graphics and an educational strategy which would not be out of place in a primary school. New titles include **Mr T in the Mystery Maze,** which shows a move towards problem-solving skills for seven plus.

The Longman range for that age group includes **Hot Dog Spotter, ABC . . . Lift Off** and **Countabout.** Those are standard programs which feature arcade routines as part of the action and have proved just as popular as the Mr T programs. The new Longman program, **Postman Pat's Trail Game,** based on the books and TV series, encourages thinking and memory skills as well as the use of the cursor keys. Postman Pat — such an inoffensive character — has to follow the trails left by various characters in the story clutching a letter or parcel. He then has to find his way back to the Post Office without help from the tracks. Greendale is pictured on the screen complete with sheep, hedges and bridges, as well as cows which block the road from time to time at the more difficult levels. For a four-year-old Postman Pat Rules!

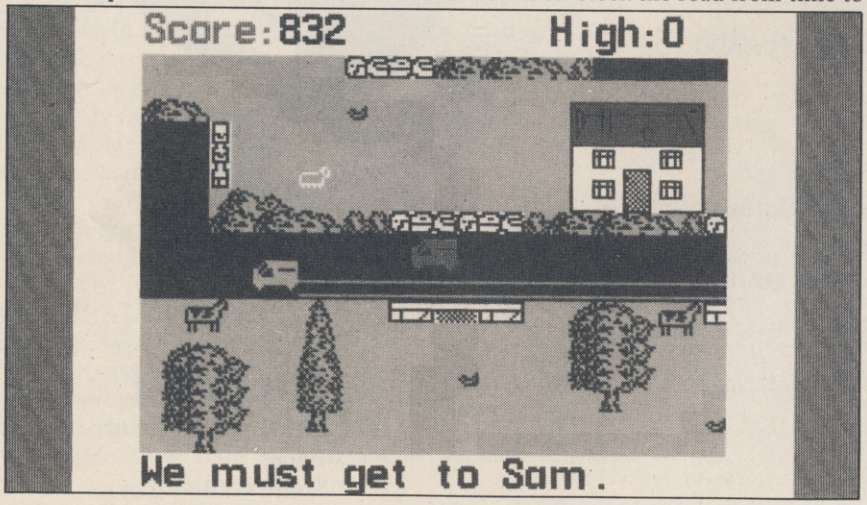


SuperTed

SuperTed is a similar program, except that this time our hero has to try and catch the villains and put them in jail before a bomb goes off. Quite delightful. A format of nine mazes is the playing area and the positions of the villains are shown on a small grid at the top of the screen. Speed and accuracy of movement round the playing areas require care, though the speed is rather too slow. It would have been useful to have a selection of playing speeds. Both programs benefit from joystick control.

Longman's middle range of programs for the 7-11 age group has nothing in particular to recommend it. That is not to say that the programs are not good, but merely that they are on a par with others. **Robot Runner,** a tables tester, **Wild Words,** a spelling tester, and **Sum Scruncher** all bear the Longman stamp of drill mixed with arcade routines. Numerous other companies provide similar programs, notably Mirrorsoft's **Quickthinking,** Sinclair's **Castle Spellerous,** and Stell Software's **Maths Invaders.**

Other new titles for the Spectrum from Longman feature programs aimed at the family, capable of supporting up to four players. In **Riddle of the Sphinx** you have to build up words on one face of a pyramid, always starting with the letter that finished the previous word. **Word Wizard** asks the players to make anagrams out of a specified number of letters. To play **Snaffle** you have to use letters as they appear on the board and build a word out of them, as well as snaffle an opponent's word to make a new combination. If a word is not in the dictionary the players can verify that such a word exists. Snaffle is the most interesting game but also the most expensive of the three.



Postman Pat's Trail Game

continued on page 159

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continued from page 157

A new company, Hill McGibbon, is set to be a rival to Longman for this age group. Formed by three ex-Heinemann people it brings long-standing experience in publishing to the field of software development. Hill McGibbon policy is to produce games of high entertainment quality in themselves, but which have an underlying educational content. New games for the Spectrum include **Run, Rabbit Run,** a board game with strategic possibilities and **Friend or Foe** which is similar, both priced reasonably. The catchphrase, 'games to stretch the mind' could set the tone for software in the future.

Longman, however, has in **First Moves** a program to teach chess for eight-year-olds upwards. Chess is surely the greatest strategy game of all time, and any program which smooths the way to understanding of the complex nature of the game must be useful. The program concentrates on the chess pieces and their moves, and comes complete with a full colour poster for handy reference.

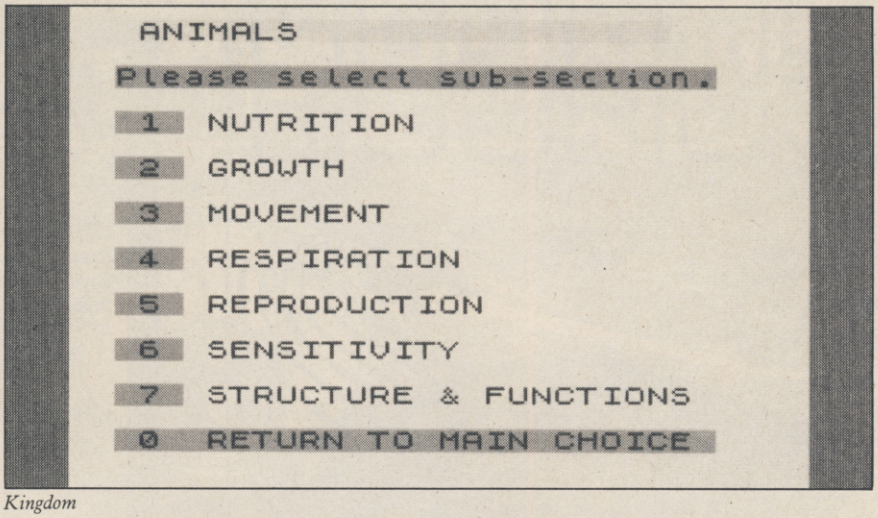
A joystick is a great aid to moving the pieces, otherwise rather a complex manipulation of the numbers one to eight is required.

The main disadvantage is that the screen board is tiring on the eyes. Longman does not help by using green and magenta for the board colours, and even with the colour turned down there is a certain amount of drift.

The program takes the user through all the moves of the pieces before starting any games, although you can go straight to the games if you wish. The games start with few pieces: level one is the King and his castle, going on to an almost complete game in level six using one of all the pieces with accompanying pawns. A Help key is available to show where each piece can be moved when it is the player's turn.

Self study is becoming a topic of serious consideration for schools, providing the chance for a student to learn at his/her own pace, and Longman is uniquely placed for this. The revision package **French** O level and CSE has to be considered the best of its type.

Chalksoft's **Eiffel Tower** is a French vocabulary tester providing 20 word lists in two programs for £9.25. The Longman program has 29 word lists in two programs which have comprehensive testing facilities. Sulis Software has produced a package to revise French irregular verbs, at £9.95. The Longman package contains a program which enables the student to revise the same.



Kingdom

As well as those two facilities the Longman program has a composition tester, where the user has to remember a short piece of French prose and then ENTER it, and a map-based program highlighting the regions and towns of France. The price is £7.95, which must be considered a good buy under the circumstances.

The revision program **Biology** shows a similar range of activities. There are five programs. **Text** carries nearly 400 references over the subject, and the student is advised to make a note of those on his/her syllabus, and pay particular attention to those marked with a star. **Skeleton** is a word game which asks questions and builds up a picture of a skeleton with labels.

Heredity covers just that, but in an interactive way. It tests knowledge of the principles of heredity by asking the student to forecast the outcome of a particular mating in the form of a percentage. You are also able to set up breeding combinations and see what happens. **Kingdom** is an exploration of the main types of creatures and plants. A specimen or example can be identified by its characteristics.

It is also possible to compare the different types of life form. This is an excellent way of coming to grips with all those long Latin names as well as gaining an overview of the main classifications used.

Food covers the major components of nutrition and tests knowledge of the same.

Both the French and Biology packages appeal within their limitations, and represent reasonable value for money; they also help with revision strategy and organisation of time by pinpointing areas of the subjects concerned with precision.

Overall, the Longman range for the Spectrum seems particularly strong in the rule and drill and revision departments but lacks a variety of strategy, problem-solving games and adventures. First Moves excepted. That is probably a result of the company's involvement in educational texts which leads it to concentrate on those formats rather than enter what might perhaps be considered a more creative use of the Spectrum.

Title	Memory	Price	Gilbert Factor
Postman Pat's Trail Game	48K	£5.95	7
SuperTed	48K	£5.95	6
Word Wizard	48K	£7.95	6
Riddle of the Sphinx	48K	£7.95	6
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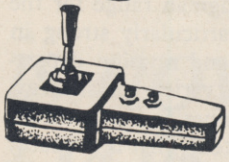

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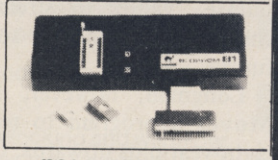

Eprom programmer for the 2516, 2716/32/32A/64/64A/28/128A, yes even the 64A/128A from Intel. Check, Read, Progam & Verify all or part of Eprom.

So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-SP. No Personality Cards, or other additions, just a Spectrum. Several inbuilt safety features. On-board Vpp generation. 28pin ZIF socket. Cabled connector and extender plug. ABS case. **£89.95**

STATUS
NO. OF SYSTEM —HEX
EPROM TYPE —27128
RAM START ADDR —4000
EPROM ST. ADDR — 0000
JOB LENGTH — 4000
TASK — CHECK

WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO RAM
Y) BLOW AN EPROM WITH DATA FROM RAM
Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM
Q TO QUIT R TO RESTART

FAST CODES AVAILABLE
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BLOPROM-81
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"The appearance of a new program from Level 9 is a flag-day for all aspiring adventures and, in my household, a signal for the cat to hide under the bed for the duration against the inevitable moment when I go rampaging through the flat, a wild look in my eyes muttering ferociously about bricklaying birds nudist beaches and the like. Since *Return to Eden*, the sequel to *Snowball* is out, the cat may be in hiding until Christmas.

You don't need to have played *Snowball* to get into the sequel as ever, there is ample documentation with the tape which in my Commodore 64 version (it is also on the Spectrum, Amstrad and BBC), is turbo-loaded. It starts with you, agent Kim Kimberly, having been framed for sabotaging the colonyship Snowball, in a crashed stratoglider on the planet Eden. For the moment your mission is to survive the misplaced retribution by your own people, but life gets very much more complicated than that. Solving these puzzles has nothing to do with luck: you either figure your way out of trouble on Eden or die there.

One major difference between this and former Level 9 efforts is that the Spectrum and C64 versions have graphics of a very high quality and can be switched off if required. The scope of the vocabulary appears unscathed by this addition.

Even experienced adventurers will probably get fried a few times by the avenging engines of the Snowball, before discovering how to take shelter. But, once that hurdle is passed the real adventure begins, and it's a lulu.

From the radioactive desert caused by the engine blast, you progress through a variety of hazards through some highly unlikely locations.

I haven't got to that point yet, and so far superhuman willpower has stopped me using the clue sheet provided, but I can't hold out very much longer since I am having what could be lethal communication problems with some robots. Terrific fun, but should carry a mental health warning." *Popular Computing Weekly 7 Nov 84*

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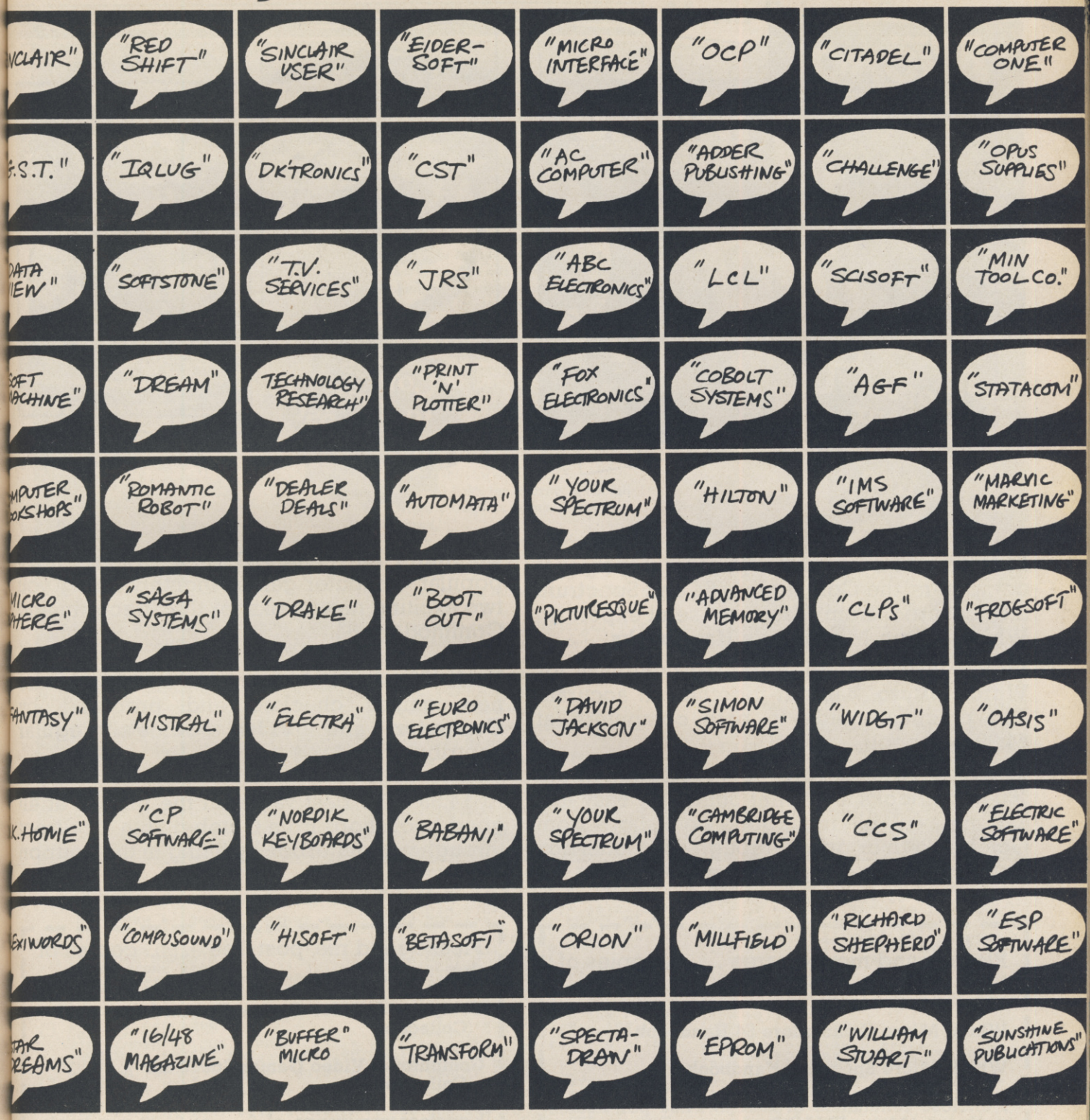

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Alan Pratt cooks up a method of organising program structure

MenuMaster

FOR ANYONE who wishes to use a Spectrum for other purposes than playing games there is a wealth of literature aimed at teaching the Basic language. Many who have mastered aspects of that find themselves directed towards writing games programs rather than more serious applications. The main reason for that is the lack of direction in the literature towards developing business or educational type programs.

We can, however develop a technique for writing non-games type programs which is both simple in concept and in widespread use already. The resulting programs come under the general category of Menu Driven Programs.

Many who have decided to delve into the Basic language quickly become disillusioned because of its apparent unstructered nature. That means the majority of programs are difficult to break down into definite sections. They are like a book with only one paragraph covering several pages.

It is possible to write a program in Basic as a series of sections each of which can be RUN as a separate program without necessarily relying on all the other sections. That is exactly how a menu driven program is constructed, with the menu section forming the skeleton from which other sections are accessed. Many commercial programs for large computers are menu driven as the operators are not programmers. From the programmer's point of view the advantages of having separate sections is that each can be made error free before the next is written.

new: detects if a character has been drawn or loaded from tape 0=no, 1=yes.
a=0, b=1, e=7: those frequently used numbers are stored in variables which are then used in place of the numbers to save memory.
menu=200 (defines the line number 200).
n$(10) contains the name of the character (used in LOAD/SAVE to tape).
w$ is a frequently used comment.
e$(13) used to blank out 13 characters on the screen.
d(8) used in the binary conversion loop.
c(24,4) holds the numeric values of each byte in the character.
a(24,32) holds the contents of the full screen 1=filled in square, 0=empty square,
i, j, k, m are temporary variables.
j$ is a temporary string.
t and **t$** are used in 'Fill a$()' to reconstruct the full screen display from the numbers in c().
r and **c** are used to define the pen tip on the screen as row and column numbers.
r1 and **c1** are temporary values of r and c.
p determines if the pen is to rubout or draw: −1=rubout, 1=draw.
q and **w** are used to detect which of the cursor keys are being pressed. These are read using IN statements.

Table 1. Variable list for Program 1.

The main section containing the menu displays a set of options available to the user with some means of selecting between them. That can take various forms but the simplest is to number each option. All the user has to do is to press the correct number on the keyboard. It is the options which consitute the independent sections.

We will develop a program which is menu driven whilst describing the techniques used and how they apply to any program of that type. The program is a graphics character generator which allows you to develop a large character composed of 12 normal-sized characters arranged as three rows of four columns. The large character is drawn eight times full size on a grid occupying the full screen with a 'pen' which is capable of both drawing and rubbing out. The final large character can be displayed full size and saved on tape for future use by Program 1 and Program 2.

The second program uses the characters to illustrate the letters of the alphabet and is intended as a teaching program for young children. It is also menu driven to further illustrate the techniques.

You will probably have met a menu driven program on the second side of

continued on page 166

```
 10 REM       BIG GEN
 20 REM  (c)  A. Pratt   1984
 30 REM
 40 LET a=0: LET new=a: LET b=1
 LET e=7
 50 PAPER e: INK a: BRIGHT a
 60 DIM n$(10): DIM e$(13): DIM
d(8)
 70 DIM c(24,4): DIM a$(24,32)
100 POKE 23658,8
110 RESTORE 5000
120 FOR i=new TO 15: READ j$: P
OKE USR "s"+i,VAL j$: NEXT i
130 FOR i=b TO 8: READ d(i): NE
XT i
140 LET w$="WAIT A MINUTE"
150 LET menu=200
200 REM Menu
210 BORDER e: CLS : PRINT INK e
; PAPER b; BRIGHT b;"       BIG GR
APHICS GENERATOR       "
220 FOR i=b TO 3: BEEP .03,3: B
EEP .06,b: NEXT i
230 PRINT AT 2,e; BRIGHT b;"Sel
ect your option"
240 PRINT AT 4,e;"Draw a New Ch
aracter"
250 PRINT AT 6,e;"Instructions"
260 PRINT AT 8,e;"Redraw Existi
ng Character"
270 PRINT AT 10,e;"Display the
Character"
280 PRINT AT 12,e;"Display the
Numbers"
290 PRINT AT 14,e;"Save the Cha
racter"
300 PRINT AT 16,e;"Use a Saved
Character"
310 PRINT AT 18,e;"Use Graphics
A to L"
320 PRINT AT 20,e;"End the prog
ram"
340 LET j=4
350 LET i=CODE INKEY$-48: IF i>
0 AND i<10 THEN GO TO 400
360 PRINT INK a;AT j,2;(j-2)/2
370 LET j=j+2: IF j=22 THEN LET
 j=4
380 PRINT INK e;AT j,2;(j-2)/2
390 GO TO 350
400 REM Sort out choice
410 GO TO i*300+200
500 REM New character
510 BORDER 5: CLS : PRINT AT 2,
9; BRIGHT b;"New Character";AT i
3,9;w$;AT 11,9; INK e; PAPER 2;
FLASH b;"INITIALISING."
520 DIM c(24,4): DIM a$(24,32)
530 FOR i=b TO 24: PRINT AT e,1
5;i
540 FOR j=b TO 32
550 LET a$(i,j)="0"
560 NEXT j: NEXT i
570 BORDER 6: CLS : PRINT AT 2,
9; BRIGHT b;"INSTRUCTIONS"
580 PRINT '''Use the arrow key
s , 5 to 8 , tomove around the g
rid."
590 PRINT '''To turn the pen on
and off pressthe , 0 , key."
600 PRINT '''  Once the pattern
is complete     press , C , to c
ontinue."
610 GO SUB 5000
620 BORDER e: CLS
630 FOR i=a TO 255 STEP 8
640 PLOT i,a: DRAW a,175: NEXT
i
650 FOR i=a TO 175 STEP 8
660 PLOT a,i: DRAW 255,a: NEXT
i
670 FOR i=a TO b: FOR j=a TO 31
680 PRINT #0;AT i,j;"S"
690 NEXT j: NEXT i
700 LET new=b: GO TO 4200
800 REM Instructions
810 BORDER 5: CLS : PRINT AT a,
9; BRIGHT b;"INSTRUCTIONS"
820 PRINT '"BIG GEN allows you
to draw largeGraphic Characters
composed of  12 normal character
s arranged as3 rows of 4 charact
ers."
830 PRINT "Each normal characte
r is made upof 64 pixels (or dot
s) on a 8x8 grid hence each larg
e character is composed of a 32x
24 grid."
840 PRINT "The character is dra
wn magnified8 times. A highlight
ed cursor  square is moved arou
nd the grid using the arrow keys
."
850 PRINT "The cursor (+) is be
st treated  as the tip of a pen
which can beset to draw or rubou
t using the  0 key"
860 PRINT '"Select options 1,7
or 8 when theprogram is first RU
N.": GO SUB 5000
870 GO TO menu
1100 REM Old Character
1110 IF NOT new THEN GO TO 3000
1120 GO TO 4000
1400 REM Display Character
1410 IF NOT new THEN GO TO 3000
1420 BORDER 6: CLS : PRINT AT 2,
5; BRIGHT b;"Display the Charact
er"
1430 GO SUB 5100
1440 FOR i=5 TO 21 STEP 8
1450 PRINT AT 11,i;"ABCD";AT 12,
i;"EFGH";AT 13,i;"IJKL"
1460 NEXT i
1470 GO SUB 5000
1480 GO TO menu
1700 REM Display Numbers
1710 IF NOT new THEN GO TO 3000
1720 CLS : PRINT AT 2,8; BRIGHT
b;"Display Numbers"
1730 PRINT '''The numbers are pr
inted in four columns and repres
ent the       following Graphics
 Characters ; "
1740 PRINT '''The first 8 rows a
re: A  B  C  DThe next  8 rows a
re: E  F  G  HThe last  8 rows a
re: I  J  K  L"
1750 PRINT '''Once the numbers a
re displayed  press any key to c
ontinue."
1760 GO SUB 5000
1770 CLS : FOR i=b TO 24
1780 FOR j=b TO 25 STEP 8
1790 IF i<23 THEN PRINT AT i-b,j
+2;c(i,(j+7)/8)
1800 IF i>22 THEN PRINT #0;AT i-
23,j+2;c(i,(j+7)/8)
1810 NEXT j: NEXT i
1820 PAUSE 0
1830 GO TO menu
2000 REM Save the Chr
2010 IF NOT new THEN GO TO 3000
2020 BORDER 5: CLS : PRINT AT 2,
6; BRIGHT b;"Save the Character"
2030 INPUT "Enter the Name (max
10 letters) ";n$
2040 PRINT AT 11,6; BRIGHT b;"Sa
ving  ";n$
2050 SAVE n$CODE USR "a",96
2060 BORDER 4: PRINT AT 13,6; PA
PER 4;"  Stop the tape     "
2070 GO SUB 5000
```

Program 1.

continued from page 165

the **Horizons** tape in the form of "character" which is also a graphics character generating program. In that case only one screen display is used with the menu occupying the lower portion of the screen. Options are selected by pressing the appropriate letter keys.

Before describing Program 1 it is worthwhile looking at some general practices which can be adopted when writing any program. Those result in the program lines 10 to 150 and are arranged as follows. Lines 10 to 30 are REM lines which contain the title, and a copyright notice enabling the program to be easily identified by the first few lines. Frequently used numbers are assigned to variables in line 40. The screen colours are established in line 50 whilst all the arrays are DIMensioned in lines 60 and 70. The POKE in line 100 is a useful means of setting CAPS LOCK on.

Lines 120 to 130 read in the necessary data for the user defined graphics and array d< > with line 110 reminding you where to find the first data line. Line 140 contains a frequently used message which is held in w$.

The most commonly used GO TO statement, at the end of each option section, refers to the start of the Main menu. To assist in identifying those the variable 'menu' is set equal to 200, which is then treated as a line number in the statement 'GO TO menu'.

The variable 'new' in line 40 is used to detect if a character has been generated and prevents you using options 4, 5 or 6 before you have selected 1, 7 or 8.

new: detects if the data associated with the program has been changed. 0=no, 1=yes.
a = 0, b = 1, e = 7: these frequently used numbers are stored in variables which are then used in place of the numbers to save memory.
menu = 200 (defines the line number 200).
n$(10) contains the name of the character (used in LOAD/SAVE to tape).
i$** and **s$ are frequently used questions.
c$(32) used to blank out a full line on the screen.
i, j, lim are temporary variables.
w=address of the bytes for the character selected in ROM.
t=address of the graphic character in the data.
xsize and **ysize** define the magnification of the character printed by the subroutine at line 7000.
xpos and **ypos** are the x and y coordinates of the character printed by the subroutine at line 7000.

Table 2. Variables for Program 2.

```
  10 REM     Alphabet Learner
  20 REM  (c)  A. Pratt  1984
  30 REM
  40 CLEAR 30099: LOAD ""CODE :
BEEP 1,12
  50 LET a=0: LET new=a: LET b=1
: LET e=7
  60 PAPER e: INK a: BORDER e: B
RIGHT a
  70 DIM n$(10): DIM c$(32): POK
E 23658,8
  80 LET i$=" Select a Letter ?
"
  90 LET s$="Select your option"
 100 LET menu=200
 200 REM Menu
 210 BRIGHT a: BORDER e: CLS : P
RINT INK e; PAPER b; BRIGHT b;"
          ALPHABET LEARNER
 220 FOR i=b TO 3: BEEP .03,3: B
EEP .06,b: NEXT i
 230 PRINT AT 8,e; BRIGHT 1;s$
 240 PRINT AT 11,e;"Instructions
"
 250 PRINT AT 13,e;"Learn by Pic
tures"
 260 PRINT AT 15,e;"Examine old
pictures"
 270 PRINT AT 17,e;"Load in new
pictures"
 280 PRINT AT 19,e;"End the prog
ram"
 290 LET j=11: LET lim=6: GO SUB
 4300
 400 REM Sort out choice
 410 GO TO i*500
 500 REM Instructions
 510 CLS : PRINT AT a,9; BRIGHT
b;"  Instructions  "
 520 PRINT '''ALPHA' is a teach
ing program tohelp young childre
n learn the    letters of the Alp
habet."
 530 PRINT '''Select option 2 to
obtain a      large version of a
ny letter withan associated pict
ure."
 540 PRINT '''The pictures are d
rawn with the help of the progra
m 'BIG GEN'    and then loaded in
to 'ALPHA' by selecting option 4
."
 550 PRINT '''Whenever new pictu
```

Program 2.

Now to the main program section which contains the menu. That occupies lines 200 to 390 and starts with a REM line to identify the section. It is good practice to use as many REM lines as possible when writing a program to make it easier for others to understand. The fully developed program was written to run on a 16K Spectrum which still has enough memory to support an adequate number of REM lines.

You will notice the use of the PRINT AT function in all the following lines in order to produce a screen display which is both tidy and easy to understand. Whenever I write a program containing screen displays I always sit down with a 32 by 24 grid representing the full screen and plan the layout with a pencil and rubber before attempting to write any program lines.

Following the title and the instruction 'Select your option' which are both highlighted, the various options are spelt out in short titles which are intended to be self explanatory. As with all good menu programs there is a choice titled 'Instructions' which will enable the first time user to understand

```
2080 GO TO menu
2300 REM Use Saved Chr
2310 BORDER 5: CLS : PRINT AT 2,
6; BRIGHT b;"Use a saved Charact
er"
2320 INPUT "Enter the Name (max
10 letters) ";n$
2330 PRINT AT 11,6; BRIGHT b;"
Loading ";n$
2340 PRINT AT 13,6; INK 2; FLASH
 b;"  Start the tape  "
2350 LOAD n$CODE USR "a"
2360 BORDER 4: PRINT AT 11,6; BR
IGHT b;" ";n$;" loaded "
2370 PRINT AT 13,6; PAPER 4;"
Stop the tape          "
2380 PRINT AT 15,a;"          ";
BRIGHT b;w$
2390 REM Fill c()
2400 LET m=a
2410 FOR k=a TO 16 STEP 8
2420 FOR i=b TO 4: FOR j=b TO 8
2430 LET c(j+k,i)=PEEK (USR "a"+
m)
2440 LET m=m+1
2450 NEXT j: NEXT i: NEXT k
2460 REM Fill a$()
2470 FOR i=b TO 24: PRINT AT e,1
5;i: FOR j=b TO 4
2480 LET t=c(i,j): LET t$="00000
000"
2490 FOR k=b TO 8
2500 IF t>=d(k) THEN LET t$(k)="
1": LET t=t-d(k)
2510 NEXT k
2520 LET a$(i,j*8-7 TO j*8)=t$
2530 NEXT j: NEXT i
2540 PRINT AT 15,9;s$
2550 GO SUB 5100: LET new=b
2560 GO SUB 5000
2570 GO TO menu
2600 REM Use existing chrs
2610 BORDER 6: CLS : PRINT AT 2,
9; BRIGHT b;"Use existing Graphi
c Characters"
2620 PRINT AT 5,6; BRIGHT b;"  A,B,C,D  E,F,G,H
  I,J,K,L  "
2630 GO TO 2380
2900 REM End
2910 BORDER 4: CLS : PRINT AT 2,
10; BRIGHT b;"  THE END  ";AT 15
,10;"BYE  FOR NOW"
2920 GO SUB 5100
2930 STOP
3000 REM Error
3010 BORDER 2: CLS : PRINT AT 10
,b; BRIGHT b;"There is no existi
ng character"
3020 PRINT AT 15,5; BRIGHT b;"Re
fer to Instructions"
3030 GO SUB 5000
3040 GO TO menu
4000 REM Redraw
4010 CLS
4020 FOR i=b TO 22
4030 FOR j=b TO 32
4040 IF a$(i,j)="0" THEN PRINT "
S";
4050 IF a$(i,j)="1" THEN PRINT "
T";
4060 NEXT j: NEXT i
4070 FOR i=23 TO 24
4080 FOR j=b TO 32
4090 IF a$(i,j)="0" THEN PRINT #
0;AT i-23,j-1;"S";
4100 IF a$(i,j)="1" THEN PRINT #
0;AT i-23,j-1;"T";
4110 NEXT j: NEXT i
4200 REM Reset variables
4210 LET r=a: LET c=r: LET p=-1
4220 LET r1=r: LET c1=r: LET out
=r
4230 GO TO 4460
4250 REM Loop
4260 PAUSE VAL "2"
4270 IF INKEY$="C" THEN LET out=
1: GO TO 4390
4280 LET q=IN 63486: LET w=IN 61
438
4290 IF q<192 THEN LET q=q+64
4300 IF w<192 THEN LET w=w+64
4310 IF w/2-INT (w/2)=a THEN LET
 p=-p: FOR i=b TO e: NEXT i: GO
TO 4450
4320 IF q=255 AND w>253 THEN GO
TO 4250
4340 IF q<255 AND c<>a THEN LET
c1=c-b
4350 IF (w=251 OR w=243 OR w=235
) AND c<>31 THEN LET c1=c+b
4360 IF (w=239 OR w=235) AND r<>
23 THEN LET r1=r+b
4370 IF (w=247 OR w=243) AND r<>
0 THEN LET r1=r-b
4390 REM Set array
4400 IF r<22 THEN PRINT AT r,c;i
$
4410 IF r>21 THEN PRINT #0;AT r-
22,c;i$
4420 LET a$(r+1,c+1)="0"
4430 IF p=b THEN LET a$(r+1,c+1)
="1"
4440 LET r=r1: LET c=c1
4450 IF out THEN GO TO 4500
4460 LET i$="S": IF p=b THEN LET
 i$="T"
4470 IF r<22 THEN PRINT AT r,c;
BRIGHT 1;i$; OVER b;CHR$ 8+"+"
4480 IF r>21 THEN PRINT #0;AT r-
22,c; BRIGHT b;i$; OVER b;CHR$ 8
+"+"
4490 GO TO 4250
4500 REM Calculate
4520 BORDER 5: PRINT AT 11,10; B
RIGHT b; FLASH b;" CALCULATING "
4530 FOR i=b TO 24
4540 FOR j=b TO 25 STEP 8
4550 LET c(i,(j+7)/8)=VAL ("BIN
"+a$(i,j TO j+7))
4560 NEXT j: NEXT i
4600 REM Fill Graphics
4610 LET m=a
4620 FOR k=a TO 16 STEP 8
4640 FOR i=b TO 4
4650 FOR j=b TO 8
4660 POKE USR "a"+m,c(j+k,i)
4670 LET m=m+b
4680 NEXT j: NEXT i: NEXT k
4690 GO TO 1400
5000 PRINT #0;AT b,3; FLASH b;"P
ress any key to continue": PAUSE
 0
5010 RETURN
5100 FOR i=5 TO 21 STEP 4
5110 PRINT AT 7,i;"ABCD";AT 8,i;
"EFGH";AT 9,i;"IJKL"
5120 NEXT i
5140 RETURN
6000 DATA "128","128","128","128
","128","128","128","255"
6010 DATA "127","127","127","127
","127","127","127","0"
6020 DATA 128,64,32,16,8,4,2,1
7000 REM Save program
7010 SAVE "BIG GEN"
7020 BEEP 1,12: STOP
```

```
res are loadedyou will be asked
to re-record this program."
 990 GO SUB 5000: GO TO menu
1000 REM Learn
1010 CLS : PRINT AT a,6; BRIGHT
b;" Learn by Pictures "
1030 GO SUB 4400
1110 BRIGHT b: CLS : INK 2
1130 LET w=15360+i*8
1140 LET lim=a: LET xpos=77: LET
 ypos=167
1150 LET xsize=9: LET ysize=xsiz
e
1160 GO SUB 7000: INK 4
1230 LET w=15360+(i+32)*8
1240 LET xpos=93: LET ypos=79
1260 GO SUB 7000: INK 5
1300 PRINT INK a;AT 5,12;"is for
"
1330 LET w=(i-65)*96+30100
1340 LET lim=11: LET xpos=152: L
ET ypos=79
1350 LET xsize=3: LET ysize=xsiz
e
1360 GO SUB 7000
1400 LET t=30100+(i-65)*96
1410 GO SUB 4100: INK b
1440 FOR i=2 TO 6 STEP 4
1450>PRINT AT i,21;"ABCD  ABCD";
AT b+i,21;"EFGH  EFGH";AT 2+i,21
;"IJKL  IJKL"
1460 NEXT i: INK a
1480 GO SUB 5000: GO TO menu
1500 REM Examine
1510 BORDER 5: CLS : PRINT AT b,
6; BRIGHT b;"Examine old Picture
s"
1520 PRINT AT 4,2;"Examine the P
resent pictures    associated wi
th the letters."
1550 PRINT AT 8,e; BRIGHT b;s$
1560 PRINT AT 11,e;"Examine old
picture"
1580 PRINT AT 13,e;"Return to ma
in menu"
1600 LET j=11: LET lim=3: GO SUB
 4300
1650 IF i=2 THEN GO TO menu
1700 CLS : PRINT AT e,8; BRIGHT
b;"Present Picture"
1710 GO SUB 4400
1740 LET t=30100+(i-65)*96
1750 PRINT AT 15,a;c$: GO SUB 41
00
1770 PRINT BRIGHT b;AT 10,14;"AB
CD";AT 11,14;"EFGH";AT 12,14;"IJ
KL"
1790 GO SUB 5000: GO TO 1510
2000 REM Load
2010 BORDER 6: CLS : PRINT AT b,
6; BRIGHT b;"Load in New Picture
s"
2020 PRINT AT 4,2;"Change the ex
isting pictures    associated wi
th the letters."
2050 PRINT AT 8,e; BRIGHT b;s$
2060 PRINT AT 11,e;"Load new pic
ture"
2080 PRINT AT 13,e;"Return to ma
in menu"
2100 LET j=11: LET lim=3: GO SUB
 4300
2150 IF i=2 THEN GO TO menu
2190 LET new=b
2200 CLS : PRINT AT e,8; BRIGHT
1;"Load New Picture"
2210 INPUT "Name of new picture
?";n$
2220 PRINT BRIGHT b;AT 10,e;"Loa
ding ";n$
2230 PRINT INK 2; FLASH b;AT 12,
e;"  Start the tape  "
2240 LOAD n$CODE USR "a"
2250 PRINT AT 10,a;c$;AT 14,a;"
"
2260 PRINT PAPER 4;AT 12,e;"  St
op the tape  "
2270 LET t=30100+(CODE n$(1)-65)
*96: GO SUB 4000
2280 PRINT AT 12,a;c$; BRIGHT b;
AT 10,14;"ABCD";AT 11,14;"EFGH";
AT 12,14;"IJKL"
2290 GO SUB 5000: GO TO 2010
2500 REM End
2510 IF new THEN GO TO 8000
2520 BORDER 4: CLS : PRINT AT 10
,10; BRIGHT b;"  THE END  "
2540 PRINT AT 15,10; BRIGHT b;"B
YE FOR NOW"
2550 STOP
4000 REM Transfer 1
4010 FOR i=a TO 95
4020 POKE (i+t),PEEK (USR "a"+i)
4030 NEXT i: RETURN
4100 REM Transfer 2
4110 FOR i=a TO 95
4120 POKE (USR "a"+i),PEEK (i+t)
4130 NEXT i: RETURN
4300 REM Input 1
4310 LET i=CODE INKEY$-48: IF i>
0 AND i<lim THEN RETURN
4320 PRINT INK a;AT j,2;(j-9)/2
4330 LET j=j+2: IF j=lim*2+9 THE
N LET j=11
4340 PRINT INK e;AT j,2;(j-9)/2
4350 GO TO 4310
4400 REM Input 2
4410 LET j=b: PRINT AT 15,6;i$
4420 LET i=CODE INKEY$: IF i>64
AND i<91 THEN RETURN
4430 PRINT BRIGHT b;AT 15,j+5;i$
(j)
4440 LET j=j+b: IF j=20 THEN LET
 j=b
4450 PRINT AT 15,j+5;i$(j)
4460 GO TO 4420
5000 PRINT #0;AT b,3; FLASH b;"P
ress any key to continue": PAUSE
 0
5010 RETURN
7000 REM Big Print
7010 FOR d=a TO lim
7020 FOR q=a TO e
7030 LET val=PEEK (w+d*8+q)
7040 FOR z=a TO e
7050 IF val-2*INT (val/2) THEN F
OR t=b TO ysize: PLOT xpos-z*xsi
ze,ypos-q*ysize-t: DRAW b-xsize,
0: NEXT t
7060 LET val=INT (val/2)
7070 NEXT z: NEXT q
7080 LET xpos=xpos+xsize*8
7090 IF d=3 OR d=7 THEN LET xpos
=152: LET ypos=ypos-ysize*8
7100 NEXT d
7110 RETURN
8000 REM Save program
8010 CLS : PRINT AT 10,0; BRIGHT
 1;"The program must be re-recor
ded."
8020 SAVE "ALPHA" LINE 10: BEEP
1,12
8030 SAVE "Alphacode"CODE 30100,
2496: BEEP 1,14: STOP
```

how to use the program.

The final choice allows the user to stop the program without reverting to using the BREAK key or pulling the plug out.

After printing all the titles the program needs to identify each option. In this case the numbers 1 to 9 are printed down the left hand side. That is done with lines 360 to 380 which may appear complicated but the effect produced is of a flashing band travelling quickly down the numbers and reminds the user the machine is waiting for a choice to be made.

Line 390 completes the program loop which is another essential part of a menu program. The lines 350 to 390 are repeated endlessly until a valid key is pressed which identifies a menu option. Line 350 is used to detect when that happens by looking at the contents of INKEY$.

In Appendix A of the Spectrum Manual is the ASCII table which gives the code for each character. The codes for the numbers start at 48 and go to 57, hence by subtracting 48 from CODE INKEY$ a number corresponding to the key pressed is obtained. That is then tested to see if it falls within the range of the options, in this case 1 to 9, and if it does the machine jumps to line 400. Line 410 directs the machine to the correct program section using the Spectrum capability of GO TO a variable — or in this case a formula using a variable — which is treated as a line number.

Type in the program lines 10 to 410 and 6000 to 6020 and save them on tape. RUN the program and you will obtain the menu on the screen with the numbers on the left flickering in sequence. Try pressing any key except the numbers 1 to 9 and nothing should happen. Now press a number between 1 and 9 and the report 0 OK, 6020:1 should appear. If it does not you can correct your mistakes and RUN the program as many times as you like until it does what it is supposed to do. As all programmers realise writing a program may seem easy but getting it to work and do what you intend is something completely different. By allowing the program to be broken into separate sections the whole program need not be written at once.

The menu section is relatively easy to write and you can copy lines 100 to 410 of this program with changes to the titles for your own menu program.

Although each option section is ideally independent of all the others, there are always some routines which are used by two or more sections. The best example in Program 1 is the routine which returns the machine to the Main menu and consists of a subroutine at line 5000. In general all common routines should be separated from the option sections and written as subroutines near the end of the program.

As well as using subroutines the program also contains two routines which are used by two option sections but are entered at different points by each section. The first of those has been taken out of the option section and located between lines 4000 and 4690. That is the main drawing routine and is itself separated into sections by REM lines which identify entry points. It also contains its own subroutine at line 4600 which changes the characters in a$. The array represents the full character using '0' for an empty square and '1' for a filled in square. The drawing loop, lines 4250 to 4490, is repeated until the character is complete and key 'C' is pressed.

The second routine is associated with using either a SAVEd character or the existing graphic characters USR "A" to USR "L". It contains two routines for filling the arrays c< > and a$< > and is located within the section associated with option 7. The other option, 8, enters the routine at line 2380.

When developing the program the drawing routine was written after the main menu section. To check its operation it was necessary to include an option section to access it. When developing your own menu program you will probably follow the technique adopted of writing each option section and then testing it before proceeding with the next. Rather than use that approach now, type in the whole of the remainder of the program. Note the letters S and T in lines 680, 4050, 4090, 4100 and 4460, and letters A to L in lines 1450 and 5110 are graphics characters.

Once complete RUN the program again and press key 2. That will pro-

continued on page 168

continued from page 167

duce a set of instructions to enable you to use the program. Option 9 will allow you to stop the program and correct any mistakes in options 2 and 9 before continuing. Once you are happy RUN again and select options 4, 5 and 6 in turn. In each case you should be told to select options 1, 7 or 8 first since the variable 'new' = 0.

Now select option 1 to test the drawing routine. After initialising a set of instructions will be displayed. Memorise those and then press a letter key. The screen will now fill with a grid of black lines defining 32 by 24 squares with the top left square highlighted containing the '+' symbol. That is the tip of the drawing pen. Check the operation of the '0' and cursor keys to draw a shape before pressing the C key. After calculating the program will automatically select option 4 and display three of the characters full size and a further five joined together.

Once options 1 and 4 work properly select option 3 and your character will be reconstructed on the full screen line by line. The keys used in option 1 again become operative and you may modify the character and view it full size before returning to the menu. Now select option 5 which produces its own instructions followed by a list of the numbers.

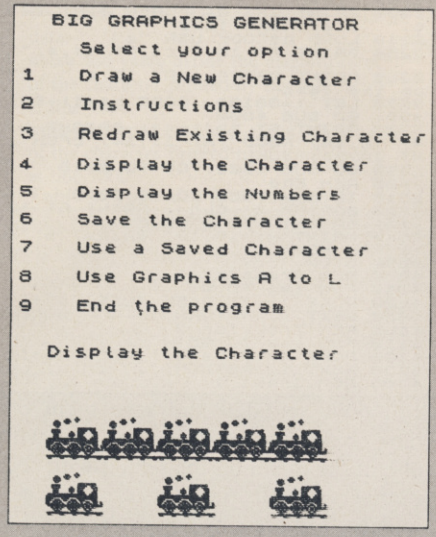
The options 6 and 7 allow you to save a character on tape — by saving the graphic characters USR "A" to USR "L"+7 — and recall a character from tape. Generate a character using option 1 and then select option 6. You will be asked for a name which is entered in capital letters automatically — do not change the cursor to lower case letters. Instructions will be given on starting and stopping the tape and I suggest you record the characters on the second side.

Now select option 7 and enter the same name you used in section 6. Rewind the tape and again follow the instructions on the screen. Once loaded the machine uses two routines to fill the arrays. Lines 2390 to 2450 are used to fill c< > and lines 2460 to 2530 use a relatively quick method to convert the numbers from array c< > into binary and insert the result in a$< >.

The last option, 8, allows you to use the existing graphics characters A to L. It is intended to be chosen instead of option 1 when the program is first RUN and allows you to use characters from another program which are preserved when NEW is used to delete that program.

Once you are happy with the program and all the mistakes are corrected type RUN 7000 and press ENTER. The routine in lines 7000 to 7020 has been included to automatically SAVE the program for you.

One final word of explanation; you will notice extensive use of PRINT 0 in this program. That allows printing on the two lines of the screen normally reserved for input and messages, enabling a grid of 24 lines to be drawn.



Program 2 is an educational program which illustrates the letters of the alphabet with graphic characters. If you have used Program 1 to generate and save some characters on tape, you will be able to load those characters into a block of data associated with this alphabet learner program.

You will recognize the initialisation and title section in lines 10 to 100. Line 40 contains CLEAR and LOAD statements which allow the data associated with the graphics characters to be held in memory from location 30100 onwards. The saved program will automatically RUN itself when loaded and all the data is then loaded as a single block of numbers.

The main menu is located from lines 200 to 290 with the options listed in lines 240 to 280. It is similar in layout to the menu in Program 1 and could be adapted to any requirement simply by changing the words. Line 290 contains a GOSUB 4300 statement which handles the INPUT of a valid option number. The reason for using a subroutine is because two of the main menu options also contain their own menus hence a common routine can be used. Remember that any common routines should be separated out as subroutines and placed near the end of the program. The variable 'j' is set to the row number containing the first option and '1im' is the number of options.

Each menu option is defined by a REM statement as are the subroutines at the end. Once again the program will fit in the 16K Spectrum.

For those of you who do not have any characters saved on tape a load program is included in Program 3 which will illustrate the letters A to D. It is limited to letter D since a longer listing would be laborious to type in and there is more enjoyment to be had in creating your own characters. This program should be typed in before Program 2 and RUN. Once complete type NEW which will delete the program but preserve the numbers in high memory.

If you do not wish to use the loader program you should type CLEAR 30099 and press ENTER. Now type in the program "ALPHA" listing in Fig 2. Note the letters A to L in lines 1450, 1770 and 2280 are graphics characters. Once you have corrected any mistakes type GO TO 8000 and follow the instructions for saving the program and then the data. After VERIFYing the tape copy type RANDOMIZE USR 0 to reset the Spectrum. Now type LOAD "ALPHA" and load in the program.

Once loaded the main menu will appear and I suggest you select option 1 first. Now you can load all those characters you saved on tape and begin to teach your children the Sinclair character set.

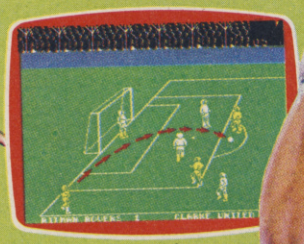
```
  10 REM      Data Loader
  20 REM   ©  A. Pratt 1984
  30 REM
  40 CLEAR 30099
  50 FOR i=30100 TO 30483
  60 READ val: POKE i,val
  70 NEXT i
  80 STOP
 100 DATA 0,0,0,0,0,0,0,1,96,48,
27,12,7,6,115,251,60,199,26,100,
155,124,0,56,0,0,128,128,0,0,0,0
 110 DATA 3,7,7,15,15,31,31,31,2
53,255,255,255,255,255,255,255,1
90,255,255,255,255,255,255,255,0
,0,0,128,128,192,192,192
 120 DATA 15,15,7,7,3,1,0,0,255,
255,255,255,255,255,128,24,255,2
55,255,255,254,252,240,192,128,1
28,0,0,0,0,0,0
 130 DATA 0,0,31,63,98,98,98,98,
0,0,255,255,8,105,105,40,0,0,255
,255,32,160,160,160,0,0,248,252,
134,134,134,134
 140 DATA 127,127,127,127,127,66
,78,110,255,255,255,255,255,8,10
4,104,255,255,255,255,32,38,
38,254,254,254,254,254,146,146,1
46
 150 DATA 86,127,123,119,111,111
,7,3,40,255,127,184,216,223,128,
0,34,255,253,59,55,247,3,1,146,2
42,178,210,234,238,192,128
 160 DATA 4,14,15,7,5,4,4,4,0,0,
0,128,192,224,112,92,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
 170 DATA 4,4,4,4,4,4,14,4,42,21
,10,5,2,2,1,0,0,128,128,64,160,8
7,47,156,0,32,32,32,248,248,1
27
 180 DATA 2,2,10,4,0,0,0,0,0,0,0
,0,0,0,0,0,79,61,31,15,21,40,26,
15,127,127,248,252,86,5,170,252
 190 DATA 4,61,132,143,252,165,3
6,62,16,240,144,128,192,128,7,63
,0,0,0,0,0,0,0,248,255,0,0,0,0,0
,0,192
 200 DATA 63,121,121,127,127,63,
62,25,127,159,239,247,55,143,127
,255,255,255,255,254,253,251,251
,229,248,252,254,255,253,249,249
,249
 210 DATA 7,6,12,24,16,24,12,0,2
43,224,96,32,32,32,32,96,134,6,6
4,4,8,8,24,249,112,48,16,16,16,
16,48
```

Program 3.

MATCH DAY

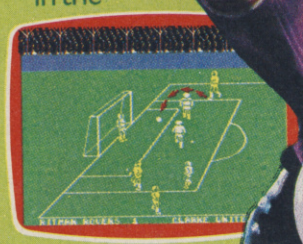
Match Day is no ordinary soccer game. Blistering 3-D action, total animation and automatic camera scan are just some of the intricate techniques which make Match Day the league leader of soccer games.
Now follow the "Action":

Your striker traps the ball from a perfectly placed corner-kick, takes on the defender and dribbles neatly round him making space to



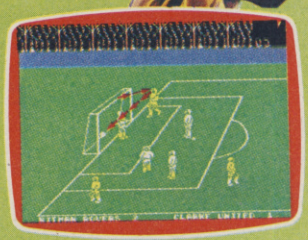
chip in a teasing cross-ball to his advancing team mate in the

six-yard box. There is no time to control the ball, your player must commit himself to a snap shot on goal. . .



his powerful half-volley rattles the cross-bar, the ball returns, floating menacingly above the penalty area and your star striker seizes this half-chance

to head the ball decisively into the back of the net. . .
. . .GOAL!



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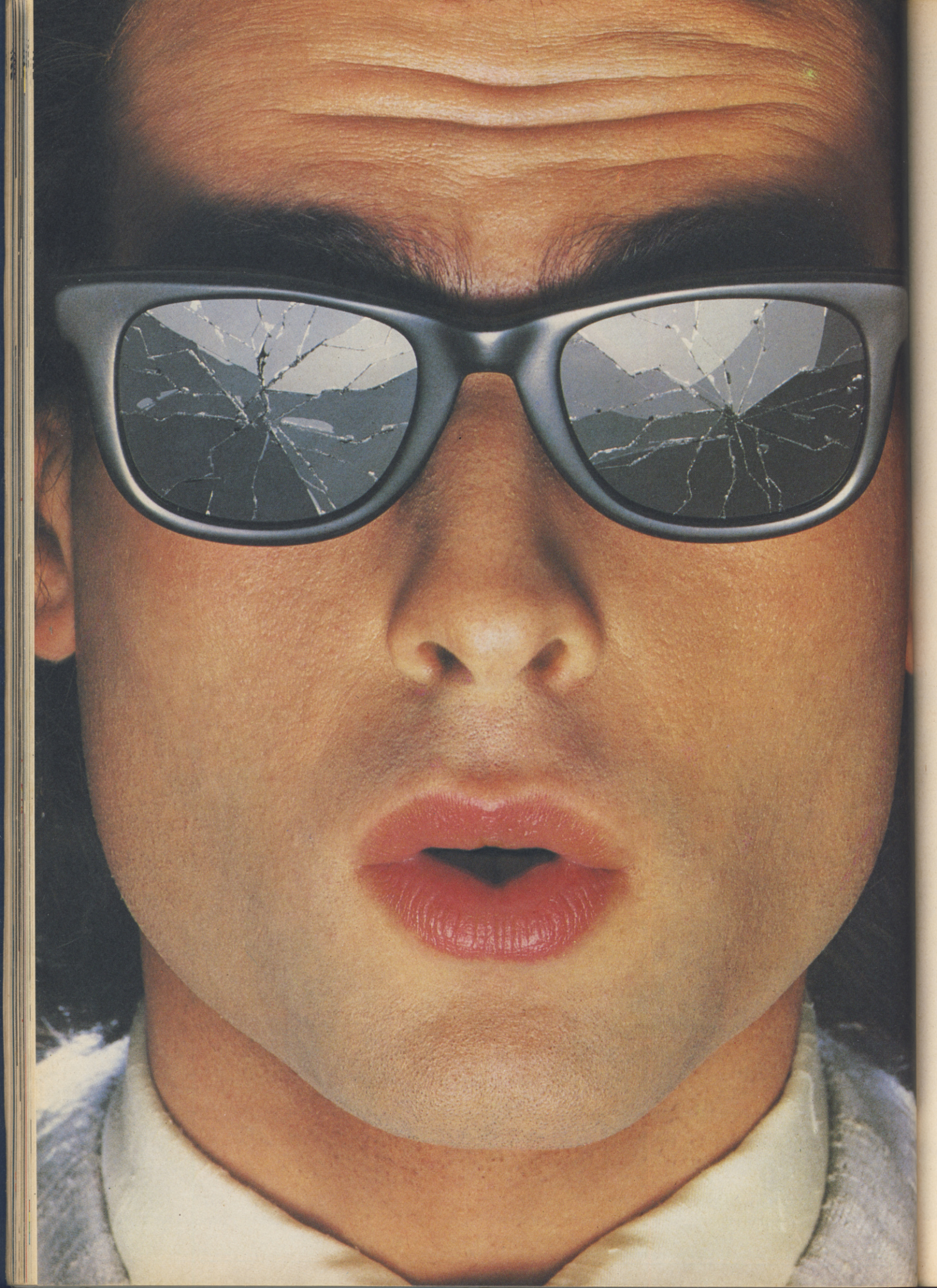

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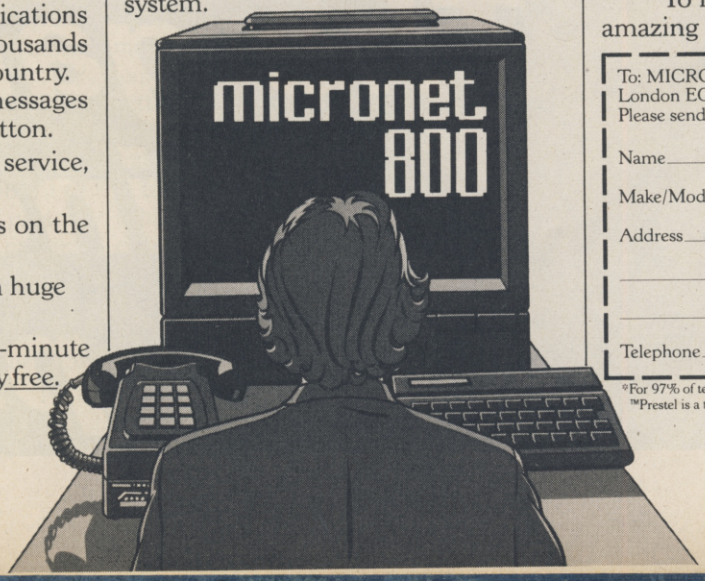

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Alison Maguire is the force guiding Sinclair's software strategy. Theo Wood discovers the principles that lie behind the product.

The games Sinclair plays

Alison Maguire is one of the more successful women in the computer industry, and as software director for Sinclair Research has seen her department grow from scratch to worldwide proportions in the two years since she joined.

Things were very different on the software scene then, back in January 1983. The Spectrum had been on the market for seven months and Sinclair had been involved in software at a marginal level only, with very few titles available. People who bought Spectrums around that time will remember only too well the level of software provision — certainly nothing in comparison to what is available today.

What, then, are her main considerations as software director? "I'm basically concerned with software publishing but in fact there is an overall responsibility to ensure that our hardware doesn't fail to sell for lack of software. At one end of our involvement we have a commitment to software for its own sake. At the other end we encourage companies to develop software which we might not sell ourselves, but which would make the hardware more attractive to a particular market."

To begin with the Sinclair involvement with software was limited to obtaining a licence to market software which was already being sold.

On arriving at Sinclair Research Maguire concentrated on familiarising herself with the Spectrum and the ZX-81, as well as the various titles which were available. Her main task was to take account of the market and the products and then to define a software strategy, although as she says, "It's very difficult to define an overall software strategy as we are really a hardware manufacturer. For example, when it comes to deciding to bundle software, I lose part of my product line, but if we sell another 50,000 computers because of it then it's very worthwhile."

The QL is the first computer which has seen activity on the software front from inception, exemplified by the inclusion of the Psion packages in the hardware product. "Since the launch in January, about 300 companies have written to us, asking for a variety of assistance with both the development of software and peripherals. That puts us in a very nice position for identifying products we are interested in."

That also generates feedback of ideas and Maguire's department is in the front line of liaison between the labs and the various companies who apply for assistance. Those companies provided an early testing ground for the QL, and indeed some were paid to do that work. Such an arrangement is an advantage in that any bugs which might exist can be eliminated at an early stage with full cooperation between the labs and the software house concerned.

Since the early days things have changed a great deal. Maguire now oversees a department comprising of two editors, a software engineer, two secretarial/PA people and a software product manager responsible for marketing and to a certain extent production as well.

"People in Britain don't want to be educated at home. Most parents want to buy something that amuses their children."

"This size of team is pretty new; in June 1984 I had only a secretary. There is now a greater commitment to software. The aim is to go into software publishing for the QL and to take advantage of the fact that we are the hardware manufacturer."

Although almost half the Spectrum sales are overseas, the Spectrum+ will have a further impact on those markets. The new user guide will have been translated into 19 languages by Christmas 1984 and software sales will presumably follow hardware. How does Sinclair Research intend to take advantage of that?

"There are various ways in which we are tackling it. Wherever we've got a new branch office — as in Germany, Italy or France — we have local software managers already appointed. I will meet them regularly so we have information flowing back and forth. We are looking at a variety of arrangements for getting English software translated, though it's not always appropriate to translate software."

In recent months large foreign publishing companies have approached Sinclair as to distribution rights. If local branch offices agree Sinclair may deal direct especially if the company has a sound background. "Up until now it's been only titles in our catalogue for which we have discussed foreign rights. There hasn't been anyone who has had the time to think carefully about foreign rights, because we have been so busy setting up the new department and the QL. We are now thinking about it and it's occurred to me that as with the expansion pack, which is totally non-Sinclair, it may be time to offer non-Sinclair suppliers a chance to get at our distributors. I'm considering ways to invite people to do so. In some foreign markets it is very difficult to make money out of software but we still need it to be there. If we can provide an easy route for the software to be there legally then we will make it less easy for the pirates."

There has been a lot of talk about the education market overtaking the games market. "Last year we were talking about schools and the DoI scheme, in which the Spectrum was involved. We published some titles in association with Macmillan and I wanted Sinclair to be involved with a respected long-standing name in education because I thought we were viewed possibly as fly-by-nights.

"However, that market has been disappointing. I think that whether or not all the educationalists would like it, educational software has not sold well. People in Britain don't want to be educated at home, unlike in the States. The idea was ahead of its time, but it may happen soon because educational software now is more entertaining than before. The difficulty is deciding who are you selling to, parents or children. Most parents are indulgent and want to buy something that amuses their children."

Edutainment? "I loath that word. Although the extraordinary thing is I sometimes wonder whether our view, as adults, about what children should enjoy, is wrong."

Maguire was recently sent a program which was a simulation of property dealing and rent management and her two daughters of nine and 11 spent a whole day playing with it.

"They said it was the best program they had ever played, and at the end of that time they knew what a balance sheet was and something about the relationship between managing people and making profits. I was amazed at this; it wasn't the zap-it-up game which they usually like. Nevertheless it's difficult to sell that type of game to retailers."

What does she feel about the current image of computers, dominated by games which appeal mostly to boys?

continued on page 176

See Micronet 800 in action.

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Southend-on-Sea. Computerama, 88 London Road. Tel: 0702 335443.
Southend-on-Sea. Computer Centre, 336 London Road. Tel: 0702 337161.
Southend-on-Sea. Estuary Personal Computers, 318 Chartwell North, Victoria Circus Shopping Centre. Tel: 0702 614131.

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Watford. Laskys, 18 Charter Place. Tel: 0923 31905.
Watford. S R S Microsystems, 94 The Parade, High Street. Tel: 0923 26602.
Watford. Trewins, Queens Road. Tel: 0923 44266.
Welwyn Garden City. D J Computers, 40 Fretherne Road. Tel: 96 28444.
Welwyn Garden City. Welwyn Department Store. Tel: 0707 323456.

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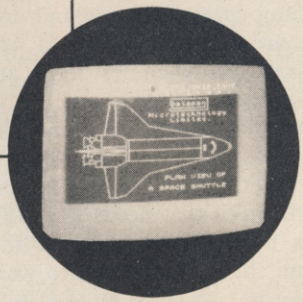

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continued from page 173

"Obviously, when we look for software here we try to discourage violence but if we apply that kind of rule rigidly we would be turning down half the games. I think perhaps that zap-it-up games are becoming a little bit old hat. But then for every group of people for whom it is old hat there's another group coming up."

Maguire sees big growth ahead in the tertiary sector of education — that is, the universities and polytechnics as well as abroad. She would like to concentrate on titles which showed the machines to be something special, as rule and drill programs are scarcely likely to distinguish Sinclair machines from any other. A computer which may be an intelligent work station for university students would sell in large quantities at corporate level. Sinclair is hoping that the QL will fulfil that need. The BBC micro has been the mainstay of this market, and the QL will have to work hard to beat it.

What plans are there for QL software in the next six months? "Our first titles were announced in QLub news in October. A lot of it is development software, things like compilers which have a roll-on effect. We also have some business software coming out before the end of this year. We've got the Psion chess program too, but I must say games are not the major emphasis for the QL, although the chess program is important as it shows what the QL can do visually. We'll be launching titles every month now for the QL."

A number of people are, however, working on games for the QL and Sinclair has bought an option on the Imagine megagame **Bandersnatch.** Psion, too, has games under development.

Talk of that kind could lead easily to the idea that Sinclair had now forsaken the Spectrum in favour of the QL, and many Sinclair users must feel this way. Does this mean that the Sinclair involvement with Spectrum software in the U.K. will be limited to carrying the present titles?

"Oh no. Not at all. The Spectrum + is an indication that we think there's a lot of life in that little horse yet. We published seventeen titles for the Spectrum in the autumn. They are all 'educationals', fifteen from Macmillan and two from Psion and ASK. There's a tremendous mileage in the Specrum and we'll certainly be looking for more software for it, although when there's the choice between making some money out of a new game for the Spectrum, which is not going to sell any more Spectrums, and making a piece of software available for the QL which is going to sell the QL to a whole new market, my emphasis has to be on the latter."

It is clear that Sinclair is now poised for overseas expansion, and the groundwork for a large multinational company is being laid. No doubt when the QL production lines have satisfied the demand in the U.K., that too will follow in the steps of the Spectrum. Just as a Coke can be found in extraordinary places, intrepid travellers may find a Spectrum where they least expect it.

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GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.

Bug — an error in a program.

EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.

Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.

Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.

Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.

Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.

Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.

Port — a link to the outside world which can be used by programs and the computer.

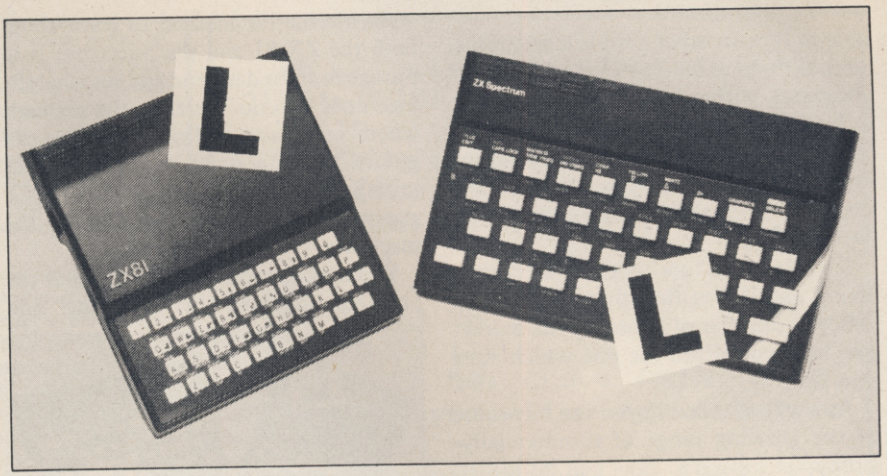
PCB — printed circuit board. A board which has on it the electronic circuits of the computer.

RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.

ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.

Software — programs which control the operation of the computer.

Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the QL computer is big enough for use in small businesses, the Sinclair computers are not really suitable for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

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able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

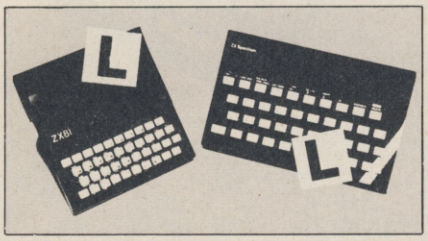
As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

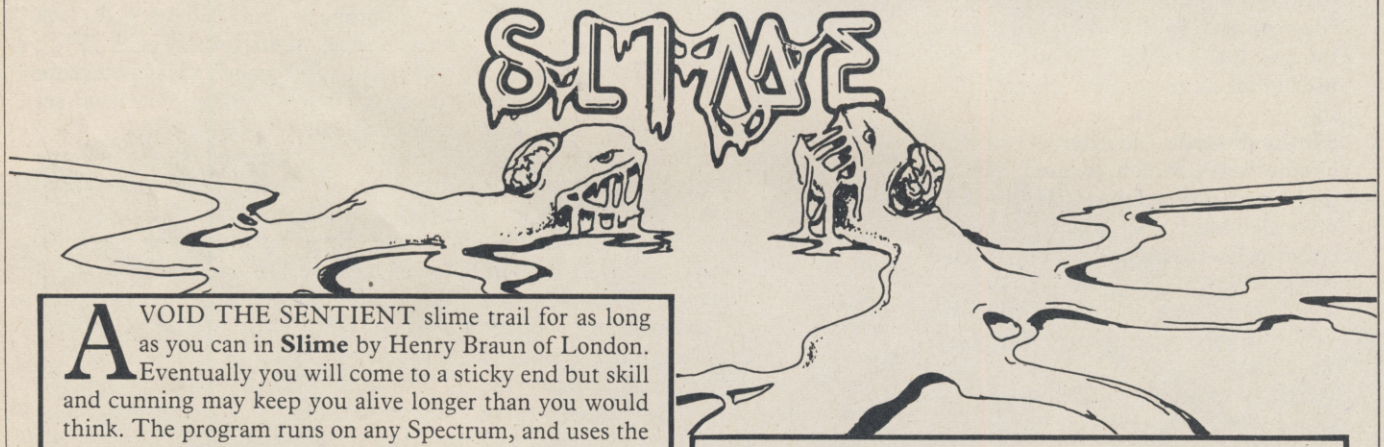
Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then rewind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.



AVOID THE SENTIENT slime trail for as long as you can in **Slime** by Henry Braun of London. Eventually you will come to a sticky end but skill and cunning may keep you alive longer than you would think. The program runs on any Spectrum, and uses the cursor keys for movement.

Slime uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

Lines 5-10	Set up the initial values for the variables used. Most are 0 because nothing has happened yet, but x1 and y1 are given the co-ordinates for the starting point on the screen.
Line 30	The beginning of a loop containing the game. Where x1 and y1 were the co-ordinates for the slime trail, x2 and y2 will be your position. x and y are to hold the new position, but first it checks to see that move you make.
Lines 40-50	It would be easy to read the keyboard with a line like IF INKEY$= . . . THEN . . . but that is a slow and inelegant way of doing it. If there are several options you need a line for each one. Instead Henry uses logic operations. The expression (INKEY$="6") is given the value 1 if true

```
  5 LET hi=0
  10 PAPER 7: INK 0: BORDER 2: C
LS : LET s=0: LET x=1: LET y=0:
LET x1=20: LET y1=30
  30 LET x2=x: LET y2=y
  40 LET x=x+(INKEY$="6")-(INKEY
$="7")+(x<1)-(x>20)
  50 LET y=y+(INKEY$="8")-(INKEY
$="5")+(y<1)-(y>30)
  55 IF SCREEN$ (x,y)="*" THEN
GO TO 1000
  60 PRINT AT x2,y2;"(sp)";AT x,
y;"(cc9,ig6,cc8)"
  65 LET x3=x1: LET y3=y1
  67 IF RND>.5 THEN  GO TO 80
```

	and 0 if false. The statement as a whole in line 40 means: "If you are pressing 6 then add one to x, if you are pressing 7 then take one away from x, and if x is smaller than one add one and if it is bigger than 20 subtract one." Those last two ensure you never go off the edge of the screen.
Line 55	SCREEN$ is a function which looks at the characters held in the screen display. This line checks to see if there is slime where you are about to move.
Line 60	The new position is blank so you can move there, and the program prints a flashing graphics character there. cc9 is an abbreviation for a control code, in this case the one which produces the flashing. It is produced by going into extended mode, then holding down CAPS SHIFT and pressing the appropriate key, in this case 9. Nothing will appear on the screen, but the next character will flash.
Line 65	Duplicates the position for the slime.
Line 67	To introduce an element of luck, the slime moves partly at random.
Lines 70–90	Compare your position in x and y with the position of the slime and alter it accordingly. The random feature ensures the slime does not always make the most efficient move towards you.
Line 100	Having survived one move, your score is increased.
Line 110	Sends you back for another move. The fact there is no line 20 is irrelevant, the next instruction will be line 30.
Line 120	Is a rather peculiar safety measure. If the program skipped past line 110 it is sent back there.
Line 1000	The game is over, and your score is displayed.
Lines 1010–1020	If you have the high-score you are told so and a new high score is displayed.
Lines 1030–1070	Ask if you want to play again. In those lines the keyboard is read with IF statements instead of the earlier logic operations, as there would be little gain to the more compressed method.

```
  70 LET x1=x1+(x>x1)-(x<x1)+(x1
<1)-(x1>20)
  75 IF x1<>x3 THEN  GO TO 90
  80 LET y1=y1+(y>y1)-(y<y1)+(y1
<1)-(y1>30)
  90 PRINT AT x1,y1;"(cc4,i*,cc0
)"
 100 LET s=s+1
 110 GO TO 20
 120 GO TO 110
1000 PAUSE 50: CLS : PRINT AT 0,
0;"You stayed alive for ";s;" mo
ves."
1010 IF s>hi THEN  LET hi=s: PRI
NT : PRINT "You got the highscor
e": INPUT "What is your name? ";
a$
1020 IF hi>0 THEN  PRINT "The hi
-score is ";hi;" and was(6*sp)ac
hieved by ";a$
1030 PRINT : PRINT : PRINT : PRI
NT "Another game?(y/n)"
1040 IF INKEY$="" THEN  GO TO 10
40
1050 IF INKEY$="y" THEN  GO TO 1
0
1060 IF INKEY$="n" THEN  STOP
1070 GO TO 1040
```

Happy Days

THE QUAINTLY-NAMED **Happydays** is a calendar program which will tell you the day of the week for any given date, as long as it falls after the introduction of the Julian calendar. That will almost certainly include all of our readers' birthdays, so the program is a good opportunity to discover if you are merry and gay, or work hard for a living, according to the old rhyme.

Enter the day and month as figures, and the year in full, e.g. 1985. Happydays was written by Hsieh Min Hon of Singapore and runs on the ZX-81 in 1K.

```
 10 PRINT "DAY?"
 20 INPUT D
 30 PRINT "MONTH?"
 40 INPUT M
 50 PRINT "YEAR?"
 60 INPUT Y
 70 LET K=INT (.6+(1/M))
 80 LET L=Y-K
 90 LET Q=M+12*K
100 LET P=L/100
110 LET A=INT (P/4)
120 LET B=INT (P)
130 LET C=INT ((5*L)/4)
140 LET E=INT (13*(Q+1)/5)
150 LET Z=E+C-B+A+D-1
160 LET Z=(Z-(7*INT (Z/7)))+1
170 PRINT D;"/";M;"/";Y;" IS A
";
180 IF Z=1 THEN PRINT "SUNDAY"
190 IF Z=2 THEN PRINT "MONDAY"
200 IF Z=3 THEN PRINT "TUESDAY"
210 IF Z=4 THEN PRINT "WEDNESDA
Y"
220 IF Z=4 THEN PRINT "THURSDAY
"
230 IF Z=5 THEN PRINT "FRIDAY"
240 IF Z=6 THEN PRINT "SATURDAY
"
250 STOP
```

EASY DRAW

IT IS POSSIBLE to produce quite complex line drawings on the Spectrum but many beginners are put off by the somewhat long-winded commands and the need to use co-ordinates.

Easy Draw by Frank Oliver of Knottingley in West Yorkshire takes much of the sweat away by allowing you to simply use the cursor keys. You can also draw diagonal lines automatically and use all the colours. Block graphics can be included in the picture.

The program runs on any Spectrum, and instructions are included.

The program uses our special abbreviations for graphics characters so please read the instructions on the first page of Program Printout.

```
  20 PAPER 7: CLS
  30 PRINT AT 0,11;"EASY DRAW";A
T 2,2;"BY F.OLIVER";AT 4,10;"INS
TRUCTIONS"
  40 REM INSTRUCTIONS
  50 PRINT AT 6,0;"DRAW KEYS = 1
 TO 8 (1-4 diagonal5-8 as cursor
s)"
  60 PRINT AT 8,0;"COLOUR KEYS=Q
WERTYUI (same orderas keyboard)"
  70 PRINT AT 10,0;"KEY 9 = BRIG
HT"
  80 PRINT AT 11,0;"KEY 0 = FILL
 IN CURSER RUN (withdesired colo
ur when finished)"
  90 PRINT AT 13,0;"KEY P=PRINT
: KEY O=STOP PRINT"
 100 PRINT AT 14,0;"KEY A = BLOC
K GRAPHICS (flashingcursor posit
ioned)"
 110 PRINT AT 16,0;"KEY S = HIGH
 RESOLUTION GRAPHICS(x,y plotted
)"
 120 PRINT AT 18,0;"SPACE KEY =
RESTART"
 130 PRINT AT 19,0;"KEY D=DOUBLE
 DRAW SPEED(disablescolours+spac
e,9,0,0-P=NORMAL)"
 140 PRINT  FLASH 1;AT 21,12;"AN
Y KEY"
 150 PAUSE 5000
 160 PAPER 7: CLS
 170 REM SCREEN SET
 180 PRINT AT 3,6;"SELECT BORDER
 COLOUR"
 190 LET a=0: LET c=8: LET d=0:
GO TO 800
 200 PAPER c: CLS : BORDER c: PA
PER 7: CLS
 210 PRINT AT 3,6;"SELECT SCREEN
 COLOUR"
 220 LET c=8: LET a=1: GO TO 800
 230 PAPER c: CLS
 240 REM PROGRAM VARIABLES
 250 LET b=1: LET c=7: LET e=0:
LET f=2: LET h=0: LET x=10: LET
y=15
 260 REM CURSOR RUN
 270 FOR g=1 TO 32: PRINT  PAPER
 c;AT 0,h;"(sp)";AT 21,h;"(sp)":
 LET h=h+1: NEXT g: LET h=1: FOR
 g=1 TO 20: PRINT  PAPER c;AT h,
0;"(sp)";AT h,31;"(sp)": LET h=h
+1: NEXT g: IF d=0 THEN  LET h=0
 280 LET c=0: LET d=1
 290 REM X,Y TRACKIING
 300 LET xx=175-(8.3333333*x)
 310 LET yy=8.2258065*y
 320 REM DRAW VARIABLES,CURSERS,
X,Y PLOT
 330 IF x$="d" THEN  LET f=3
 340 IF f=3 THEN  GO TO 400
 350 IF x$="9" THEN  LET f=1
 360 IF x$="o" THEN  LET f=0
 370 IF x$="0" AND h=0 THEN  GO
TO 270
 380 GO SUB 810
 390 IF h=0 THEN  PRINT  PAPER 0
; INK 7;AT x,0;">";AT x,31;"<";A
T 0,y;"v"
 400 IF h=0 THEN  PRINT  INK 0;
PAPER 7;AT 21,4;"x=";INT xx;"(sp
)";AT 21,23;"y=";INT yy;"(sp)"
 410 LET x$=INKEY$
 420 IF x$="p" THEN  LET f=2
 430 IF e=1 THEN  GO TO 620
 440 REM HIGH RESOLUTION GRAPHIC
S
 450 IF x$="a" THEN  LET e=1
 460 IF x$="1" THEN  LET xx=xx+1
: LET yy=yy+1
 470 IF x$="2" THEN  LET xx=xx-1
: LET yy=yy+1
 480 IF x$="3" THEN  LET xx=xx-1
: LET yy=yy-1
 490 IF x$="4" THEN  LET xx=xx+1
: LET yy=yy-1
 500 IF x$="5" THEN  LET yy=yy-1
 510 IF x$="6" THEN  LET xx=xx-1
 520 IF x$="7" THEN  LET xx=xx+1
 530 IF x$="8" THEN  LET yy=yy+1
 540 IF xx>167 THEN  LET xx=167
 550 IF xx<8 THEN  LET xx=8
 560 IF yy<8 THEN  LET yy=8
 570 IF yy>247 THEN  LET yy=247
 580 IF f=1 THEN  PLOT  BRIGHT 1
; INK c;yy,xx
 590 IF f>1 THEN  PLOT  INK c;yy
,xx
 600 GO TO 330
 610 REM BLOCK GRAPHICS
 620 IF x$="s" THEN  LET e=0
 630 IF h=0 THEN  PRINT  PAPER 7
;AT x,0;"(sp)";AT x,31;"(sp)";AT
 0,y;"(sp)"
 640 IF x$="1" THEN  LET x=x-1:
LET y=y+1
 650 IF x$="2" THEN  LET x=x+1:
LET y=y+1
 660 IF x$="3" THEN  LET x=x+1:
LET y=y-1
 670 IF x$="4" THEN  LET x=x-1:
LET y=y-1
 680 IF x$="5" THEN  LET y=y-1
 690 IF x$="6" THEN  LET x=x+1
 700 IF x$="7" THEN  LET x=x-1
 710 IF x$="8" THEN  LET y=y+1
 720 IF x<1 THEN  LET x=1
 730 IF x>20 THEN  LET x=20
 740 IF y<1 THEN  LET y=1
 750 IF y>30 THEN  LET y=30
 760 IF f=1 THEN  PRINT  BRIGHT
1; PAPER c;AT x,y;"(sp)"
 770 IF f>1 THEN  PRINT  PAPER c
;AT x,y;"(sp)"
 780 GO TO 300
 790 REM COLOUR LOOP
 800 PRINT AT 10,12;"Q=BLUE";AT
11,12;"W=RED";AT 12,12;"E=MAGENT
A";AT 13,12;"R=GREEN";AT 14,12;"
T=CYAN";AT 15,12;"Y=YELLOW";AT 1
6,12;"U=WHITE";AT 17,12;"I=BLACK
"
 805 FOR k=1 TO 100: NEXT k
 810 LET x$=INKEY$
 820 IF x$="q" THEN  BEEP .5,0:
LET c=1
 830 IF x$="w" THEN  BEEP .5,2.0
39: LET c=2
 840 IF x$="e" THEN  BEEP .5,3.8
6: LET c=3
 850 IF x$="r" THEN  BEEP .5,4.9
8: LET c=4
 860 IF x$="t" THEN  BEEP .5,7.0
2: LET c=5
 870 IF x$="y" THEN  BEEP .5,8.8
4: LET c=6
 880 IF x$="u" THEN  BEEP .5,10.
88: LET c=7
 890 IF x$="i" THEN  BEEP .5,12:
LET c=0
 900 IF x$="(sp)" THEN  GO TO 20
 910 IF d=1 THEN  RETURN
 920 IF c=8 THEN  GO TO 810
 930 IF a=1 THEN  GO TO 230
 940 IF c<8 THEN  GO TO 200
```

HELP IS AT HAND

from Softeach

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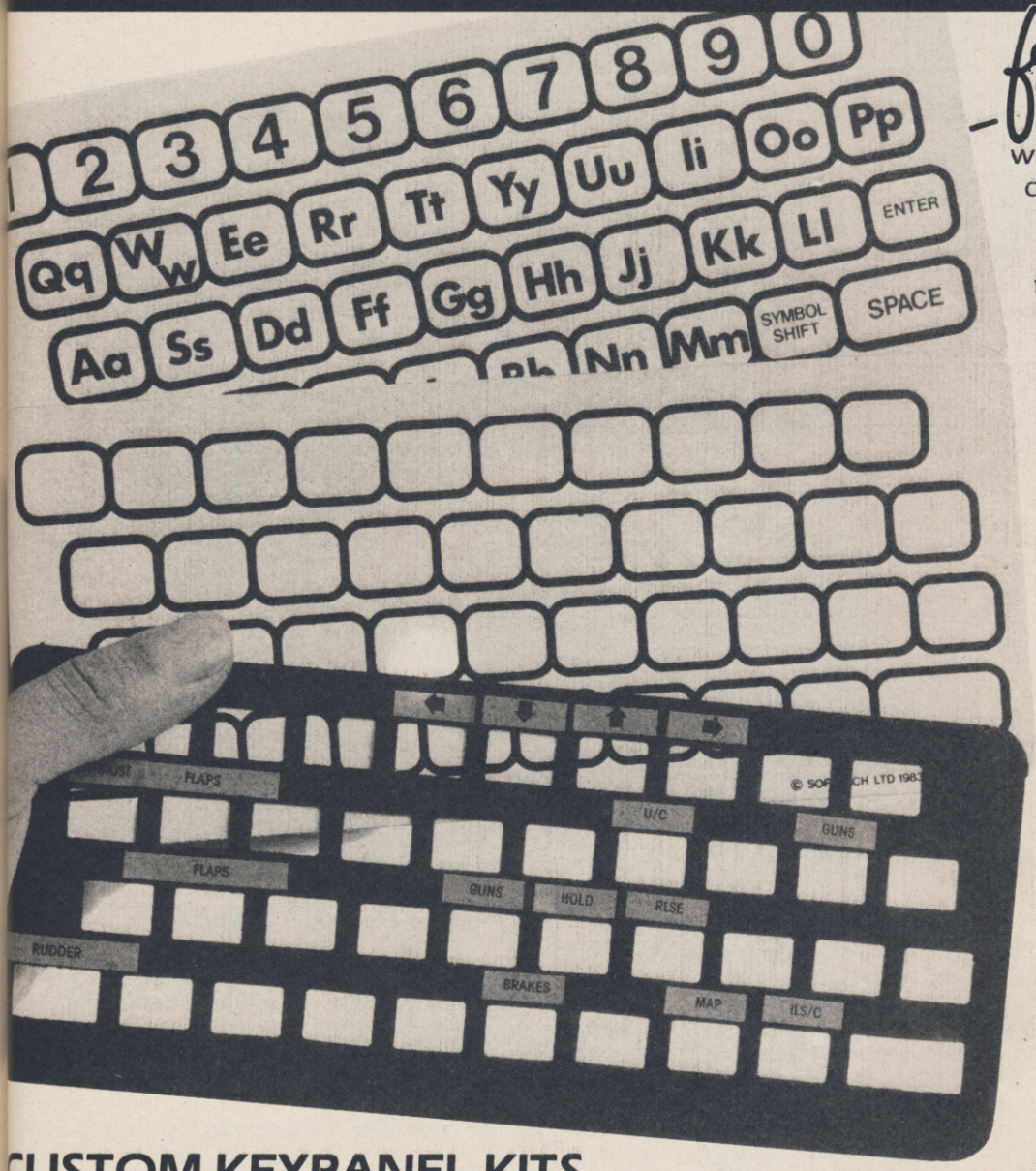

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S O F T E A C H

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Now you can use your 48k Spectrum to write a letter or a report, to compile a mailing list or classify your record collection, to check your bank statement or sort out your family finances (and then translate them into clearly-defined graphics) . . . all for just £5.95.

Quick to learn, easy to use, that's . . .

MINI OFFICE marks a long-awaited breakthrough in dramatically reducing the cost of personal computing.

For the first time it makes available to everyone an easy-to-operate version of four of the most popular business computing applications – and at a price anyone can afford.

Never before has a word processor been sold for anything as low as £5.95. Nor a database manager. Nor a spreadsheet. Nor a graphics program.

Yet Mini Office contains them all.

So how was it done?

It all started with a proposal that a package should be written that would give home users a gentle introduction to the kind of software that businesses were running on their computers.

At that stage there was no intention that it should be an ambitious package. Just a simple program that could be sold at a very low price.

First, experts in business software programming were called in and were told what was required. Their enthusiasm was immediate.

had been turned into a full scale suite of programs covering all four applications.

In fact the only part of the brief that remained was the original insistence that the package should be quick to learn and easy to use.

And despite all the extra sophistication that had been written into it, it was decided that the price should still be kept at the very low figure originally fixed.

So how does Mini Office operate?

Using the **Word Processor** is simplicity itself. There are none of the cryptic coded instructions that had to be mastered by people learning the early word processors.

You start by selecting the size of type you prefer – either normal or double-size. The latter is a feature that you cannot find on any other word processor.

It is particularly suitable for

```
A unique feature is
the double size text
option in both
printer and edit
mode - perfect for
young children and
people with poor
vision.
```

The word processor – with double size characters

But what happened next was totally unexpected. For they all came up with ideas that would considerably expand their original brief.

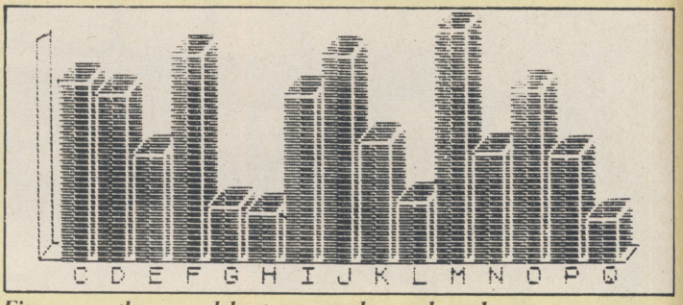
In the end what had been planned as little more than a beginners' guide to word processing, database management, spreadsheets and graphics

the partially sighted – in many cases giving them their very first opportunity to use a word processor.

This means they can use a Spectrum to compose a letter, using the double-size mode, and then print it out using normal size type.

For many people this could be the first time they can send out a perfectly typed letter without outside help.

Primary school teachers are already making great use of the



Figures on the spreadsheet can produce a bar chart . . .

double-size function, both on the screen and on hard copy printouts.

While you are using the word processor three useful pieces of information are displayed across the top of the screen.

They tell you how much time has elapsed since you started using it, the number of words you have written so far, and how many characters you can key in before the Spectrum's memory is full.

At any time you can press a key which tells you your typing speed. This is a most useful function, and can play an important part in increasing your efficiency at the keyboard.

You can also decide the size of the margin, the line length and the tab positions. Text can be copied from one part of the document to another.

At any time you can preview the text to see how it would look when printed out.

As with all the other programs in Mini Office, your work can be saved to tape and loaded when you want to use it again. It can also be printed out.

The **Database** program can be used to store a mass of information. It can be retrieved, in its entirety or just the parts you require for a particular purpose, whenever you need it.

The operation is so simple that a useful database can be created in minutes rather than days – and you certainly don't need any computer experience to set it up.

The search facility is very easy to use. You can search for a particular word or part of a word. Or you can order a numeric search – such as telling the computer to find all the numbers greater or less than the one you provide.

You can carry out multiple sorts. For instance, if you have built up a mailing list containing a list of names, addresses, telephone numbers, occupations and ages you can ask the database to provide you with a list of records in order of occupations and ages.

One powerful option allows you to replace anything on the database without having to go through the whole lot making amendments yourself.

You could, for instance, instruct it to find each reference to "teacher" and replace it with "lecturer".

The **Spreadsheet** is a new version of the program that marked an important milestone

in business computing – Visicalc.

It is often pointed out that this one program alone has helped to sell more personal computers than any other.

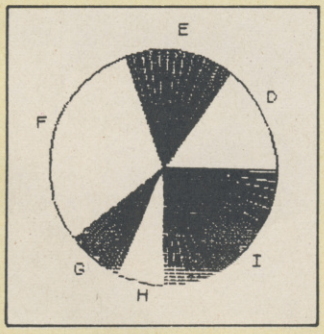
Certainly Visicalc and its derivitives have never been shaken from their position at the top of the list of best-selling business programs.

Yet the concept is very simple – a giant worksheet of rows and columns, only part of which can be seen on your screen at any one time. Into any position on the sheet you can put numbers, labels and mathematical formula.

And when you alter any figure its effect ripples through the rest of the sheet, changing any totals as may be necessary.

The Mini Office version is ideal for home finance, providing you with an effortless means of keeping tabs on your income and expenditure – and enabling you to work out your own budget.

In the Spreadsheet program – as well as in the Database – a sample file has been provided so that you can experiment with it before entering your own data.



... or a pie chart

One feature that has been included that does not exist in any other spreadsheet is a warning device to prevent you accidentally erasing formulae – a very useful precaution.

The **Graphics** program uses the standard business graphics – line, bar and pie charts. This is something not always available on far more expensive spreadsheet packages.

The program uses data you have already prepared on the spreadsheet. You have to identify which set of information you require to see in graph form – such as by indicating which row or column – and then which of the graphs you require.

The graph is then automatically configured exactly as you require it. If you have a printer capable of producing graphics you can also print out hard copies for a permanent record.

Because the original intention was to produce a package for people new to all these applications it is accompanied by a fully-detailed, easy to understand manual.

This 32 page free booklet gives clear instructions about how to use all four programs and in itself forms a concise introduction for first-time users.

If you want to start doing more with your Spectrum than just playing games, this package is your ideal introduction to the four most popular applications for professional computers.

Send for it today

Only £5.95

Please send me _____ copy/copies of Mini Office for Spectrum 48k

☐ I enclose cheque made payable to Database Publications Ltd. for £ _____

I wish to pay by

☐ Access ☐ Visa No. _____ Expiry date _____

Signed _____

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SU1

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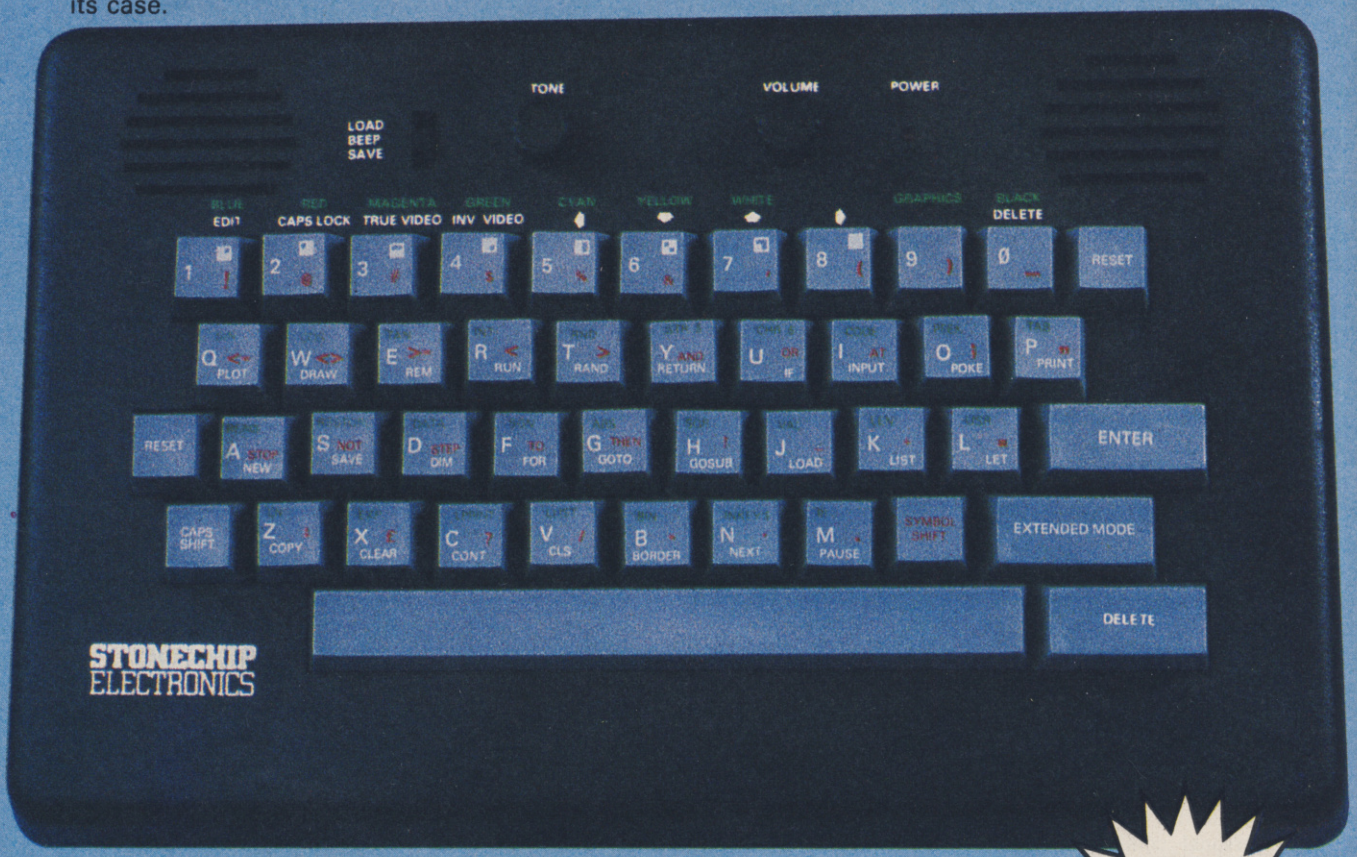
Your Sinclair guarantee need not be invalidated since the Spectrum does not require removal from its case.



THE MAIN FEATURES OF THE KEYBOARD ARE:

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Headers examined

Andrew Hewson examines headerless files and block line deletion

IT SOMETIMES happens that an item in this column rings a bell with many readers and triggers a flood of letters on the subject. My piece in *Sinclair User* November 1984 had that effect because it included a short section on SAVEing and LOADing headerless files on the Spectrum which interested a number of correspondents. I shall expand on the theme this month.

First, though, I must correct an error that crept in and was brought to my attention by Martin Carre of Guernsey, amongst others. It occurred in a table included in the piece which listed two machine code routines for SAVEing and LOADing the screen in a headerless file. The routines had been written as if the Spectrum display file and attributes file were together 6192 bytes long whereas they are in fact 6912 bytes. As a result the routines omitted to SAVE or LOAD the latter part of the attributes file. Apologies to all those who were lead astray. The correct version of the routines is given in Table 1.

Repeating the routines gives the opportunity to answer Warren Milburn of Ryton who asks: **"Please could you tell me how to alter the start address and bytes length in your routines for saving and loading headerless files?"**

Decimal	Assembler	Comment
167	AND A	Clear carry
62 255	LD A,255	Load A with 255
221 33 0 64	LD IX,16384	SAVE from 16384
17 0 27	LD DE,6912	Length 6912
205 194 4	CALL 1218	Call SAVE routine
201	RET	Return
55	SCF	Set carry
62 255	LD A,255	Load A with 255
221 33 0 64	LD IX,16384	LOAD at 16384
17 0 27	LD DE,6912	Length 6912
205 86 5	CALL 1366	Call LOAD routine
201	RET	Return

Table 1. Two Spectrum routines to SAVE and LOAD the screen display to and from a headerless file.

The start address is passed to the routines in the ix register pair and the length is passed in the de register pair and so to adapt the routines to your own purposes you must alter the values passed. Assuming you know the start address and number of bytes that you wish to SAVE or LOAD and that the routines are stored consecutively in the printer buffer, then the procedure for LOADing is as follows:

POKE 23301, START—256*INT (START/256)
POKE 23302, INT (START/256)
POKE 23304, LENGTH—256*INT (LENGTH/256)
POKE 23305, INT (LENGTH/256)

To modify the SAVE routine POKE the same values into 23311, 23312, 23314 and 23315 respectively.

The routine will be of use to Mike Hughes of Epsom who writes: **"I have written a cataloguing program which requires me to SAVE three character arrays but it is a nuisance waiting for each one to SAVE in turn and then pressing a key before the next SAVE. Is there any way of by-passing the 'start tape then press any key' message?"**

The best way of tackling the problem would seem at first sight to be to SAVE the contents of the variables area as a CODE file. It is quite easy to calculate the starting address and length parameters required for the SAVE "" CODE command — the starting address would be the value held in the VARS system variable and the length would be the difference between VARS and the E_LINE system variable.

The method would work well for SAVEing all variables but problems would occur on reLOADing because the starting address, length or arrangement of the variables area might have changed in between the two events. The starting address would have changed, for example, if a microdrive had been brought into use so that the microdrive maps occupied more space lower down in memory thereby causing the Basic program, variables and other items to be shuffled further up in RAM.

The length of the variables area would change if a new variable were brought into use or if a pre-existing array were reDIMensioned. The arrangement of the variables area would have changed if new data were written into a pre-existing string because the Spectrum handles this task by creating the string afresh at the top of the varia-

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Decimal	Assembler	Comment
42 89 92	ld hl, (23641)	E_LINE to hl
43	dec hl	Backspace to byte containing 128
237 91 75 92	ld de, (23627)	VARS to de
167	and a	Clear carry flag
237 82	sbc hl,de	Calculate length of variables area
235	ex de,hl	Transfer length to de
66	ld b,d	Copy length to bc
75	ld c,e	
197	push bc	Save bc on the stack
221 42 75 92	ld ix,(23627)	VARS (ie address to SAVE from) to ix
62 255	ld a,255	Signal cassette main file
205 194 4	call 1218	Call ROM SAVE routine
193	pop bc	Retrieve length from stack
237 67 0 91	ld (23296), bc	Store length at beginning of buffer
201	ret	Return

Table 2. A Spectrum routine to SAVE the variables area as a headerless file.

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bles area before deleting the old version, which is generally lower down in memory.

Thus the reLOADed CODE file would often end up incorrectly placed in the Spectrum memory or in the correct place overwriting the wrong things.

The safest solution, which although not ideal ensures that the data that is reLOADed does not corrupt the program, is to SAVE the variables area using a short machine code routine as a headerless file. On reLOADing use another machine code routine to execute the following steps: 1 — delete all the current Basic variables using the ROM routine for recovering redundant memory; 2 — create a new variables area large enough to hold the incoming data using the ROM routine for creating space in memory; 3 — reLOAD the variables using the routine for LOADing headerless files.

Decimal	Assembler	Comment
42 89 92	ld hl, (23641)	E_LINE to hl
43	dec hl	Backspace to byte containing 128
237 91 75 92	ld de, (23627)	VARS to de
205 229 25	call 6629	Call ROM routine to delete all variables
42 75 92	ld hl, (23627)	VARS to hl
237 75 0 91	ld bc, (23296)	New size for variables area to bc
205 85 22	call 5717	Call ROM routine to create space
55	scf	Set carry flag
62 255	ld a,255	Signal cassette main file
221 42 75 92	ld ix, (23627)	VARS to ix
237 91 0 91	ld de, (23296)	Length to de
205 86 5	call 1366	Call ROM routine to LOAD variables
201	ret	

Table 3. A Spectrum routine to delete all current variables and replace them with data from cassette.

Two routines to perform the tasks are listed in Tables 2 and 3 and as usual the decimal codes are listed so that readers without an assembler to hand can load the routines into the printer buffer using the decimal loader in Table 4.

The first routine is an adaptation of the SAVE routine in Table 1. Notice that the length of the variables area is saved in the printer buffer at address 23296 so that the load routine can reference the value when it is required. The user can also PRINT the value by invoking the routine using the PRINT USR command — because it is left in the bc register pair at the completion of the routine — so that the value can be noted for future reference.

The second routine makes two ROM calls. The first recovers the space lying between the addresses pointed to by the dep and hl register pairs thereby deleting all current variables. The second routine creates a space of length bc at the address pointed to by hl thereby creating room for the new variables. Those two ROM routines are very useful because they look after all the relevant system variable pointers no matter whereabouts in memory that the space is to be deleted or created.

The delete routine can be used to deal with a problem raised by Jeff Sims of Wigan. He writes: **I sometimes wish to delete large chunks of an existing program in order to create a new version which shares some of the original subroutines. Is there a way of doing so which is more convenient than deleting each line?**

I have described a technique previously in this column for deleting large chunks of a Basic program by manipulating the hidden pointer which the machine places after each line number to tell it the length of the line. It is comparatively straightforward to POKE a new value into the pointer in the first line of the chunk to be deleted so that the machine thinks it is dealing with one monster line. The monster line can then be deleted in the conventional way by entering the line number.

The routine listed in Table 5 achieves the same end in a rather more elegant fashion. The user POKEs the first and last line numbers of the section he wishes to delete into the first four bytes of the printer buffer as follows:

```
10 FOR I=23298 TO 23551
20 INPUT J
30 PRINT I,J
40 POKE I,J
50 NEXT I
```

Table 4. A simple decimal loader for POKEing machine code into the printer buffer starting at address 23298.

POKE 23296, LINE1-256*INT (LINE1/256)
POKE 23297, INT (LINE1/256)
POKE 23298, LINE2-256*INT (LINE2/256)
POKE 23299, INT (LINE2/256)

The routine checks each number in turn to ensure that it is non-zero and then calls the ROM routine at 6510 which returns, in the hl register, the address of the first of the two lines in RAM. It calls the same routine a second time to obtain the address of the byte following the end of the second line. The difference between the two addresses is checked to make sure that it is positive and if so the ROM routine at 6629 is called to recover the space thereby deleting the lines.

Finally I have been taken to task by Alex King of Bristol who writes: **Why do you persist in using decimal in your machine code listings when almost all other sources use hexadecimal?**

It is true that hexadecimal is the most common means of identifying numbers in assembly language programs but I feel that the majority of readers are not familiar with hex. Those who prefer hex are probably adept at conversions whereas the converse is not true — those who dislike hex probably find conversion confusing. Decimal is a compromise.

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

Decimal	Assembler	Comment
42 0 91	ld hl, (23296)	Fetch first line number
124	ld a,h	Return if both h
181	or l	and l registers
200	ret z	are zero
237 91 2 91	ld de, (23298)	Fetch second line number
122	ld a,d	Return if both d
179	or e	and e registers
200	ret z	are zero
213	push de	Save de on the stack
205 110 25	call 6510	Fetch address of first line into hl
227	ex (sp),hl	Store hl and recover de
35	inc hl	Increment number of second line
205 110 25	call 6510	Fetch address of end of second line
209	pop de	Recover first address
167	and a	Clear carry flag
237 82	sbc hl,de	Calculate length to be recovered
200	ret z	Return if zero
216	ret c	Return if negative
25	add hl,de	Rebuild address
205 229 25	call 6629	Recover space
201	ret	Return

Table 5. A Spectrum routine to delete all Basic lines lying between two line numbers passed to the routine in the printer buffer.

Britain

Aylesbury Computer Club: 12 Long Plough, Aston Clinton, Aylesbury, Bucks.

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867).

Basildon: Roundacre Microcomputer Users' Club. J Hazell, Basildon 285119/416333. Meetings every Wednesday 7.30 to 10.30pm.

Blackburn Computer Club: 1 Sutton Street, Feniscowles, Blackburn, Lancashire. Tel: B'burn 60033 (office hours) or 28127. Meets twice a month, subscription £5 (£3 juniors).

Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.

Broughty Ferry Magic Micro Spectrum Users Club: Lindsay Darroch 78 Marlee Road, Broughty Ferry (0382) 75459 or Fraser McGuire, 7 Kenaway Place, Broughty Ferry, Dundee (0382) 75821.

Cardiff ZX Club: Steve Smith (0222) 593237 or Mike Hayes (0222) 371732. Meets twice a month.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Computer Club International, 6 Drumdoon Walk, Downpatrick, N. Ireland BT30 6UF.

Cornard Sinclair User Group: Neil MacDonald, 15 Potkiln Road, Great Cornard, Sudbury, Suffolk CO10 0DA.

Crewe and Nantwich Computer Users' Club: J E A Symondson, 46 London Road, Stapeley, Nantwich, Cheshire CW5 7JL.

Daventry & District Computer Club: c/o Daventry Ex-servicemen's Club, Market Square, Daventry, Northants.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Edinburgh: Edinburgh Home Computing Club. John Palmer (031 661 3183) or Iain Robertson (031 441 2361).

EZUG-Educational ZX-80-81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other Wednesday.

Glasgow ZX-80-81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241).

Gloucester: Mid-weekly Spectrum User Group. Barry Ledbury, 8 Linnet Close, Gloucester GL4 9XA (0452) 23186.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Hobbit Appreciation Society, 12 Middlefield Lane, Hinckley, Leicestershire LE10 0RB. Free newsletter with SAE.

Independent QL Users Group: Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes MK11 1JU. Tel: 0908 564271. Publishes newsletter.

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meets every other Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Baker, 32 Heatherington Road, London SW4 7NX.

Liverpool ZX Club: Meetings every Wednesday 7pm at Youth Activities Centre. Belmont Road, Liverpool 6. Keith Archer, 031-236 6109 (daytime).

Llanelli Computer Club: 40 Tan-Y-Bryn, Burry Port, Dyfed. Llanelli 56917.

Manchester Sinclair Users' Club: Meets every Wednesday, 7.30pm, at Longsight Library, 519 Stockport Road, Longsight — 061-225 6997 or 061 445 6316.

Meopham: National ZX Spectrum User Club. Guy Fullalove, Woodcotes, Camer Park, Meopham, Kent DA13 0XS. Bi-monthly newsletter, subscription £1.50. Send SAE for details.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Surrey KT19 0SY.

Mid-Kent Micro Club: Meets once monthly. Enquiries to M Gates, 65 Buckland Road, Maidstone ME16 0SH.

Mill Lane Association Computer Group: Bryan McAlley, 1 Cowleaze, Chinnor, Oxfordshire. (0844) 52426.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30. Enquiries to R G Martin (0782 62065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 Monday, 6pm.

Nottingham Microcomputer Club: ZX-80-81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Roche Computer Club: 8 Victoria Road, Coop Rooms, Roche, Cornwall: 0726 890473. Twice weekly meetings, Monday and Friday.

Saltcoats Computer Club: Colin Borland, 117 High Road, Saltcoats, Ayrshire KA21 5SD. Weekly meetings.

Sinclair Postal User Group: 24 St. Mary's Way, Code SUL, Chigwell, Essex IG7 5BX. Produces magazine with competitions.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield: South Yorkshire Personal Computing Group. R Alderton (0742 20571), S Gray (0742 351440), P Sanderson (0742 351895).

Sinclair Amateur Radio User Group: SAE or two IRCs for details. Paul Newman G4 1NP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

Sittingbourne: Anurag Vidyarth (0795 73149).

St Albans: Bi-monthly meetings and a magazine. Details from Adam Slater, 40 Watford Road, St Albans, Herts AL1 2HA. (0727 54176).

Stratford-on-Avon Computer Club: Meets on the second Wednesday of every month. Telephone: 0789 68080 for details.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.

Washington Sinclair Users' Club, Columbia Community Centre, Tyne and Wear. Meets twice a month, tel. 4179483 or 4167367.

West Sussex: Midhurst and District Computer User Group. Enquiries to V Weston (073 081 3876), R Armes (073 081 3279).

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068).

Universal ZX Club: Postal club for Spectrum owners in the U.K. and abroad. C. Shaw, 1 Swiss Walk, Batley, W. Yorkshire.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

Overseas

Australia: Australian ZX Users' Newsletter, incorporating QL User. Paul Janson, P.O. Box 397, Dapto 3530, Australia. Also seeks unpaid contributions for the newsletter.—W.A. ZX Users' Group, Garth Gregson, 34 Chester Street, South Fremantle 6162. Phone 3351671.

Austria: ZX User Club, Thomas Christian, c/o Wissenschaft Forscht e. V., Postfach 141, A1190 Vienna. Meets every first Friday of the month. Telephone 0222-44 32 050 for details.

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.

ZZ-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre, Gratis medlemskab og gratis blad til enhver interesseret.

J Niels-Erik Hartmann, OZ-ZX-Radioamator, Bruger Gruppe, Bredgade 25 DK-4900, Nakskov.

Finland: ZX-kerho, c/o Kalevi Hamalainen, Siltakatu 9 A 8, 33100 Tampere 10, Finland. Phone 35831-34238. Publishes quarterly paper.

France: Club Micro-Europe, Chemin du Moulin 38, B-1328 OHAIN, Belgium (19/32/2/6332769 ou soir 19/32/2/6537468) or Paris-Micro, 19 rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

08 Informatique Clubs, 18 rue P Curie, 08000 Charleville-Mezieres, 24/572106; associated with Club Micro-Europe.

Yves Chapron, no. SUS-1047, Rue du Puy, La Terrasse, 38660 Le Touvet, France. Specifically for users in the Alps.

Germany: ZX Club, a postal club; contact Aribert Deckers, Postfach 967, D-7000 Stuttgart 1, West Germany.

Greece: Athens Spectrum Club, Paris Stamelos, Spetsou 2, isi22 Marousi, Athens, Greece.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Irish Sinclair Users Club: PO Box 1238, Dublin 1. Publishes a newsletter. Send SAE for details.

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Club Corner

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Italy: Sinclair Club, Via Molino Vecchio 10/F, 40026 Imola, Italy. Genova Sinclair Club; Vittorio Gioia, Via F Corridoni, 2-1, telephone 010 3125 51.

The Netherlands: Clive's Bits and Bytes, Paus Joannesstraat 32, 6235 CK Ulestraten. Telephone 043-644244.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Charles Wong, 1005 Upper Bukit Timah Road, Singapore 2367.

South Africa: Amateur Spectrum Users' Club, PO Box 280, Winklespruit, Natal 4145. Steve Reinemo is interested in corresponding with users worldwide.
South African Sinclair Users' Club: PO Box 3923, Randburg 2125. Simon Lucas, chairman. Tel. (011) 704 2596.
Dumont and Syndercombe Amateur Computer Club. Jean-Pierre Dumont would like to correspond with ZX-81 owners via tapes. Write to 8 Kipling Road, Farrarmere, Benoni 1500, Transvaal.

ZX SA Club: Jonathan Jones, House 14, Anglo Alpha PO Box 15, 1725 Roodepoorf.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.
ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S-122, 22 Enskede.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).—SAF Users' Group, 2749 Eden Road, Leslie, Michigan 49251.—ZX Users Group of New York, Box 560 Wall Street, New York, N.Y. USA 10005. Subscription $15US, publishes international newsletter. Seeks newsletter exchange with other groups.

ZXWORD

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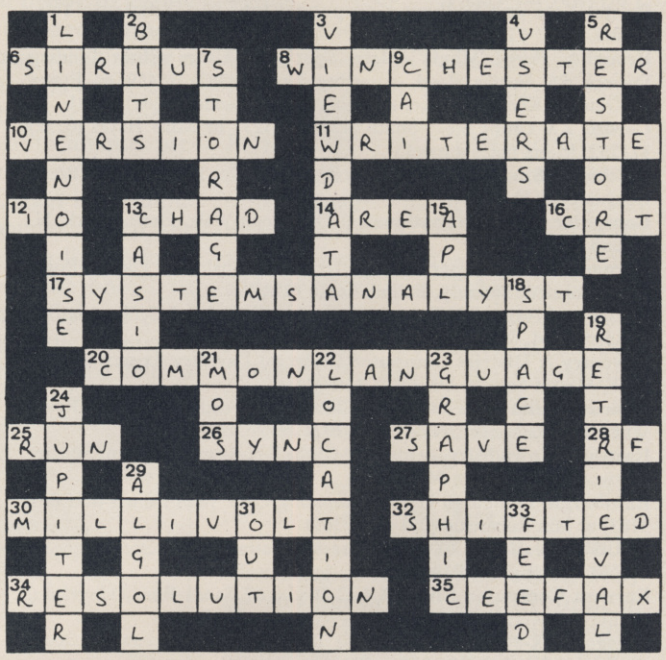
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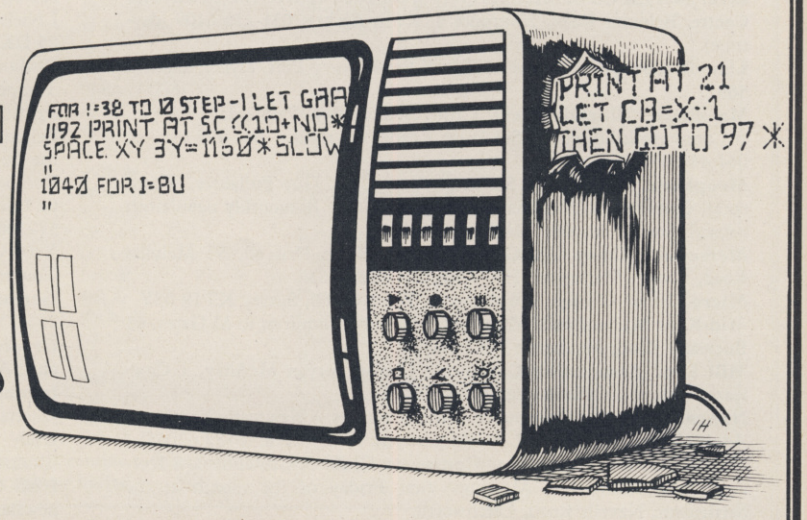

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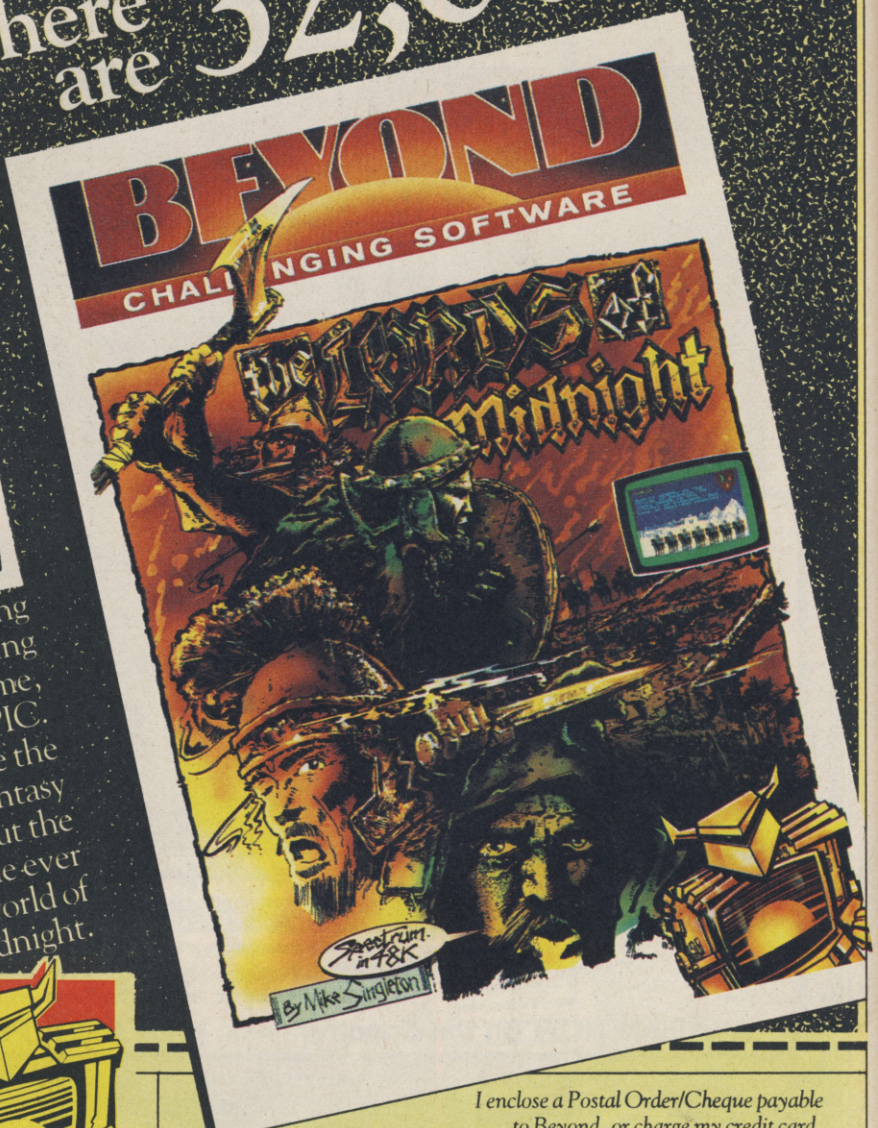

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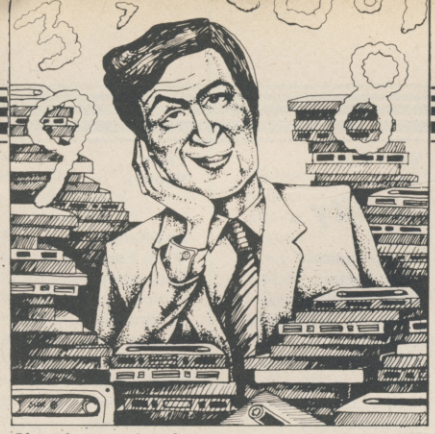

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Text	Contrast	8

Education

Binary Brains	Pooter	5
Calpac 1-2	Calpac	*
Four Rules of Number	Micro Master	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Linear Programming	University	*
Matrix Operations	University	7
O Level Chemistry	Calpac	*
O Level French Revision	Rose	*
O Level Maths Revision	Rose	*
Polynomials	University	*
Primary Arithmetic	Rose	*
Regression	University	*
Self-teach Program	Anvil	*

Language

Forth	Sinclair	7
ZX Forth	Artic	8

Practical

Ephemeris	Bridge	7
Football Pools	Hartland	*
Poolster	Naigram	3

Puzzle

Nowotnik Puzzle	Phipps	*
Word Fit	Ram Writer	6

Simulation

Flight Simulation	Sinclair	6
Pilot	Hewson	7
Print Shop	CCS	*

Strategy

Airline	CCS	7
Auto Chef	CCS	7
Battleships	JRS	*
Conflict	Martech	7
Cyborg Wars	Stratagem	7
Dallas	CCS	6
Dictator	Bug-Byte	7
Farmer	CCS	*
Fighter Pilot	Digital Integration	5
Football Manager	Addictive Games	7
Fort Apache	Contrast	8
Galaxy Conflict	Martech	8
Great Britain Ltd	Hessel	*
Ocean Trader	Quicksilva	7
Pioneer Trail	Quicksilva	7
Racehorse Trainer	G Barker	6

Traditional

Do Not Pass Go	Work Force	*
Lynchmob	Bridge	6
Original Superchess	CP Software	*
Tai	PSS	*
Tenpin	Phipps	*
ZX 1K Chess	Artic	*
ZX Compendium	Mastervision	7
ZX-Chess I	Artic	*

Utility

Graphics	IPA	*
Graphics Toolkit	JRS	9
HI Resolution	CRL	6
Machine Code Test Tool	OCP	*
MCoder	PSS	8
Programme Enhancement Package	R and R	*
Renumber Delete	Work Force	*
Trace	Texgate	7
ZX Compiler	Silversoft	*
ZX Screenkit	Picturesque	*
ZX-81 Remload	Picturesque	*
ZX-Bug	Artic	*
ZX-sideprint	Microsphere	*
ZXAS	Bug-Byte	*
ZXDB	Bug-Byte	*

SPECTRUM 16K

Adventure

Android One	Vortex	*
Escape	New Generation	8
Mines of Saturn/Return to Earth	Mikro-Gen	*
Moria	Severn	*
Planet of Death	Artic	6
Secret Valley	New Soft	*
The Great Western	New Soft	*
Time Bandits	New Soft	*

Arcade

Aquarius	Bug-Byte	6
Arcadia	Beau Jolly	5
Arcadian	J K Greye	6
Assassin	Spectrasoft	*
Avenger	Abacus	5
Baron	Temptation	*
Base Invaders	Imagination	*
Black Hole	Quest	6
Blind Alley	Sunshine	7
Bug Blaster	Crystal	*
Cassette A	Orwin	*
Caterpillar	CDS	*
Cavern Fighter	Bug-Byte	4
Centi-Bug	dk'tronics	*
Children's Compendium	Dymond	*
City Defence	Mikro-Gen	*
Colour Clash	Romik	4
Cookie	Ultimate	*
Cosmic Guerilla	Crystal	8
Crazy Cranes	Voyager	5
Creepy Crawler	Mikro-Gen	*
Crevasse and Hotfoot	Microsphere	7
Cruising	Sunshine	4
Cyber Rats	Silversoft	7
Death Chase	Micromega	6
Demolition	Comp. Rentals	*
Destroyer	Winters	*
Di-lithium Lift	Hewson	3
Digger Dan	Ocean	*
Doombugs	Work Force	8
Dymonoids	Dymond	*
Earth Defence	Artic	5
Ed-On	Add-On	4
Eskimo Eddie	Ocean	*
Family Games Pack	Hornby	*
Fireflash	Abacus	5
Froggy	DJL	7
Fruit Machine	dk'tronics	6
Galactians	dk'tronics	*
Galactic Trooper	Romik	3
Galactic Warriors	Abacus	6
Galaxians	Artic	6
Ghost Hunt	PSS	*
Gnasher	Mastertronic	4
Gobble-a-Ghost	CDS	*

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Gobbleman	Artic	*
Godzilla and Martians	Temptation	7
Ground Attack	Silversoft	6
Gulpman	Campbell	*
Haunted Hedges	Micromega	6
Hopper	PSS	6
Horace and the Spiders	Sinclair	8
Horace Goes Skiing	Sinclair	8
Hungry Horace	Sinclair	8
Invasion Force	Artic	8
It's the Wooluf	Crystal	5
Jet Pac	Ultimate	8
Labyrinth	Axis	4
Leap Frog	CDS	*
Light Cycle	PSS	*
Luna Crabs	Micromega	7
Magic Meanies	CDS	2
Maze Chase	Hewson	8
Meteor Storm	Quicksilva	7
Meteoroids	dk'tronics	7
Meteoroids	Softek	6
Micro Mouse	Lothlorien	6
Millypede	Add-on	7
Mined Out	Quicksilva	7
Moon Buggy	Visions	6
Mr Wong's Loopy Laundry	Artic	6
Muncher	Silversoft	6
Nanas	Mikro-Gen	*
Orbiter	Silversoft	7
Ostron	Softek	*
Pengy	Micromania	4
Pitman Seven	Visions	*
Planetoids	Sinclair	8
Proteus	Abacus	5
Rapedes	Visions	*
Repulsar	Softek	*
Rider	Virgin	6
Road Toad	dk'tronics	7
Robot Panic	Soft Mill	1
Sam Spade	Silversoft	5
Santa	Artic	*
Sentinel	Abacus	7
Shark Attack	Romik	5
Sheer Panic	Visions	7
Slippery Sid	Silversoft	8
Space Fighter	Winters	*
Space Intruders	Quicksilva	7
Space Lanes	Cathedral	*
Space Raiders	Sinclair	6
Space Zombies	Mikro-Gen	*
Spec. Frogs/ Showdown	Artic	*
Spec. Gobbleman	Artic	*
Spec. Invaders	Artic	*
Spec. Invasion Force	Artic	*
Spec. Scramble	Work Force	7
Spectipede	Mastertronic	5
Spectral Invaders	Bug-Byte	8
Spectral Panic	Hewson	5
Spectres	Bug-Byte	6
Strike Four	Spectresoft	4
Styx	Bug-Byte	7
Sub	Romik	*
Tank Battle	dk'tronics	8
3D Monster Chase	Romik	3
Train Game	Microsphere	9
Trom	dk'tronics	4
Vortex	JK Greye	5
Winged Warlord	CDS	6
Wizard's Warriors	Abersoft	*
Yomp	Virgin	7

Business

Finance Manager	OCP	9
Home Computer Pack	SD Micro	*
Masterfile 16	Campbell	*
Matcalc	Work Force	*
Micropen	Contrast	*
Vu-Calc	Sinclair	7
Vu-File	Sinclair	8

Education

Alphabet	Widget	*
Alphabet Games	Sinclair	*
Apostrophe	Sinclair	7
Ballooning	Heinemann	*
Calpac 1-3	Calpac	*
Car Journey	Heinemann	*
Cargo	Sinclair	*
Chess Tutor	Artic	7
Counting	Starter Soft	*
Counting	Widget	*
Education One	Lerm	*
Educational	Startersoft	*
Firework Music	Soft Cottage	8
First Numbers	Collins	*
40 Education Games	Granada	*
Four Rules of Number	Micro Master	*
French Voc Test	Tutorial	*
Hidden Letters	Poppy	*
Hot Dot Spotter	Longman	*
Integration	University	8
Intermediate English 1-2	Rose	*
Know Your Tables	Collins	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Learn Basic	Logic 3	*
Learning Read 1	Poppy	*
Linear Programming	University	*
Marks Book	Lerm	*
Maths Invaders	Stell	*
Maths Tutor	AD Software	*
Matrix Operations	University	7
Money	Poppy	*
Night Sky	Bridge	*
O Level Maths	Homestudy	*
O Level Physics	Homestudy	*
Paddington's Shopping Mix-up	Collins	*
Pathfinder	Widget	*
Polynomials	University	8
Pre/early school cassettes	Essex	*
Primary Arithmetic	Rose	*
Punctuation Pete	Heinemann	*
Regression	University	8
Self-teach Program	Anvil	*
Shape Sorter	Widget	*
Special Agent	Heinemann	*
Spellbin	Startersoft	*
Use and Learn	Microl	8

Language

Beta Basic	Betasoft	9

Practical

Biorythms	Spectrasoft	*
Countries of the World	Hewson	8
Cycle Planner	Medidata	4
Map of the UK	Kuma	7
Shopping List	SD	*
Spectasort	Spectadraw	4

Puzzle

Flippit	Sinclair	7
Hanoi King	Contrast	7
Lojix	Virgin	3
Nowotnik Puzzle	Phipps	7
Quazar	Rose	4

Simulation

Air Traffic Controller	Hewson	6
Airliner	Protek	6
Golf	R & R	7
Golf	Virgin	7
NightFlite	Hewson	5
Print Shop	CCS	8
Pro-Golf	Hornby	7

Strategy

Auto Chef	CCS	*
Big Match Soccer	Winters	*
Dallas	CCS	6
Dictator	dk'tronics	*
Farmer	CCS	*
Football	Winters	*
Heathrow	Hewson	8
Las Vegas	Temptation	*
Quincy	Severn	*

Traditional

Backgammon	Hewson	*
Bridge Tutor	CP Software	8
Bridgemaster	Serin	9
Challenge	Temptation	*
Gambling Tape	Dymond	*
Las Vegas	Temptation	5
Odds-on	RSD	*
Othello	CP Software	*
Pinball	Winters	*
Pool	Bug-Byte	7
Reversi	Sinclair	8
Roulette	Newsoft	*
Solo Whist	Video Soft.	*
Spec. Microchess	Artic	*
Super Play I	Video	*
Tennis	Winters	*

Utility

Aspect	Bug-Byte	5
Audio Sonics	Work Force	4
Auto Sonics	Buttercraft	5
Basic Utilities	Jaysoft	6
Character Generator	Spectrasoft	*
Dietron	Custom	6
Disassembler	dk'tronics	7
Display	Work Force	*
Editor/Assembler	Picturesque	8
Extended Basic	CP Software	7
FP Compiler	Softek	9
Friendly Face	Monitor	7
Keysounder	S and G	*
Letterfont	Allanson	8
Machine Code Test Tool	OCP	7
Master Toolkit	OCP	7
MCoder	PSS	8
Micropen	Contrast	*
Print Utilities	Sinclair	7
Programmer's Dream	Work Force	8
Renumber Delete	Work Force	*
Slow Loader	ELR	9
Sound FX	dk'tronics	6
Spec. Bug	Artic	*
Spec. Editor/ Assembler	Picturesque	8
Spec. Monitor	Picturesque	7
Spectrum Super Toolkit	Nectarine	8
Spectsound	PDQ	2
Supercode	CP	8
Taswide-64	Tasman	*
Trace	Texgate	8
TT-S	Timedata	8
ZX Spectrum Assembler	McGraw Hill	4
ZXED	dk'tronics	*

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Adventure

Abyss	CCS	6
Ace in the Hole	Add-on	*
Adventure 1	Abersoft	6
Adventure Island	Contrast	*
Alchemist	Beau Jolly	7
Arcane Quest	Add-on	*
Atlas Assignment	Virgin	7
Black Crystal	Mastervision	7
Black Dwarf's Lair	New Soft	*
Black Planet	Phipps	7
Buffer Adventure	Buffer Micro	6
Byte	CCS	3
Castle	Bug-Byte	*
Castle Blackstar	SCR	7
Circus	Channel 8	8
Classic Adventure	Melbourne House	*
Colditz	Phipps	8
Colossal Caves	CP Software	8
Cry Wolf!	Add-on	*
Demon Lord	MCE	5
Detective	Arcade	7
Devils of Deep	Shepherd	*
Diamond Quest	CCS	4
Diamond Trail	Gilsoft	7
Dragonsbane	Quicksilva	6
Dungeon Master	Crystal Comp.	8
Dungeons of Doom	Temptation	3
Espionage Island	Artic	5
Everest Ascent	Sheperd	6
Eye of Bain	Artic	7
Fantasia Diamond	Hewson	7
Frog Face	Positive Image	7
Golden Apple	Artic	7
Gorgon	Phipps	*
Halls of Things	Crystal Comp.	9
Hampstead	Melbourne House	8
Here comes the sun	Alligata	7
Hobbit	Melbourne House	9
Hole	Add-on	*
Horror Atoll	Add-on	*
Inca Curse	Artic	6
Inferno	Shepherd	7
Invincible Island	Shepherd	8
Island	Crystal	4
Island	Virgin	7
Jericho Road	Shards	7
Jungle Adventure	CCS	4

Kentilla	Micromega	6
Knight's Quest	Phipps	6
Leopard Lord	Add-on	4
Lords of Midnight	Beyond	9
Lords of Time	Level Nine	8
Lost Over Bermuda	Add-on	*
Mad Martha	Mikro-Gen	7
Mad Martha II	Mikro-Gen	*
Mountains of Ket	Incentive	8
Murder at Manor	Gemtime	7
Mysterious Fairground	Buffer Micro	6
Odyssey of Hope	Martech	6
Oracle's Cave	Doric	8
Orb	Comp. Rentals	*
Orc Slayer	Gamma Software	5
Paradox	Runesoft	2
Perseus and Andromeda	Channel 8	7
Peter Pan	Hodder & Stoughton	6
Pimania	Automata	7
Quest	Hewson	7
Quetzalcoatl	Virgin	8
Roundsby Incident	Add-on	*
Satan's Pendulum	Minatron	7
Sherlock	Melbourne House	9
Ship of Doom	Artic	7
Solaris	Softel	*
Spoof	Runesoft	7
Superspy	Shepherd	5
System 15000	Craig Communications	9
Temple of Vran	Incentive	8
Terror from The Deep	Add-on	*
The Final Mission	Incentive	7
Time Quest	Mikro-Gen	*
Titanic	R&R	5
Transylvanian Tower	Shepherd	7
Twin Kingdom Valley	Bug-Byte	8
Urban Upstart	Shepherd	*
Valhalla	Legend	7
Vampire Village	Terminal	4
Velnor's Lair	Quicksilva	8
Volcanic Dungeon	Mastervision	6
War of the Worlds	CRL	4
Width of the World	Mosaic	4
Ziggarat of Dread	Add-on	*

Arcade

Ad Astra	Gargoyle Games	8
Adven. of a St Bernard	Mastertronic	7
Alcatraz Harry	Mastertronic	3
Android Two	Vortex	*
Ant Attack	Quicksilva	8
Antics	Bug-Byte	8
Arena 3000	Microdeal	5
Armageddon	Silversoft	3
Astroplaner	Romik	2
Atic Atac	Ultimate	8
Automania	Micro-Gen	6
Avalon	Hewson Consultants	9
Base Invaders	Work Force	6
Battle Zone	Quicksilva	5
Beach Head	US Gold	8
Bear Bovver	Artic	8
Bewarehouse	Positive Image	4
Birds and Bees	Bug-Byte	8
Black Hawk	Creative Sparks	7
Blade Alley	PSS	6
Blue Thunder	Foundry Systems	6
Brain Damage	Silversoft	*
Bubble Buster	Sinclair	5
Bubble Trouble	Arcade	*
Bugaboo	Quicksilva	7
Butterfly	Pulsonic	4
Buzz Off	Electric	5
Caesar the Cat	Mirrorsoft	7
Carnival	Eclipse	5
Carpet Capers	Termial	7
Cavelon	Ocean	7
Centipoid Plus 3	Orwin	5
Chequered Flag	Sinclair	8
Chinese Juggler	Ocean	5
Chuckie Egg	A & F	8
Chuckman	CCI/Add-on	8
Close-In	Pulsonic	4
Codename Mat	Micromega	9
Corridors of Genon	New Generation	9
Cruise Attack	Mikro-Gen	*
Crusoe	Automata	5
Cyber Zone	Crystal	*
Daley Thompson's Decathlon	Ocean	8
Dangermouse in Double Trouble	Creative Sparks	8
Death Chess 5000	Artic	7
Defenda	Interstella	2
Deffendar	Mikro-Gen	*
Defusion	Incentive	6
Defusion/Worms	K-Tel	3
Demon	Microcosm	*
Demon Chase	Mansfield	4
Deus Ex Machina	Automata	9
Devil Rides In	Mastertronic	7
Dimension Destructors	Artic	8
Dinky Digger	Postern	4
Dodge City	Phoenix	7
Dr Franky and the Monster	Virgin	6
Dragonfire	Cheetahsoft	5
Driller Tanks	Sinclair	3
Elektro Storm	PSS	*
Energy 30,000	Elm	3
Eric and the Floaters	Sinclair	6
Eskimo Eddie	Ocean	4
Frank N Stein	PSS	7
Fred	Quicksilva	6
Freez Beez	Silversoft	*
Froot Loop	NTD Software	5
Galaxy Attack	Sunshine	4
Ghost Rider	Positive Image	4
Gilligan's Gold	Ocean	6
Glug Glug	CRL	6
H. Dumpty and the F. Wuzzies	Artic	5
Harry Goes Home	Pulsonic	6
Hickstead	CCS	4
High Noon	Work Force	9
House of Living Dead	Phipps	*
Hunchback	Ocean	7
Invasion Body Snatch.	Crystal	9
Jack and the Beanstalk	Thor	5
Jackpot	Comp. Rentals	*
Jet Set Willy	Software Projects	9
Killer Knight	Phipps	5
Knight Rider	Hewson	*
Kokotoni Wilf	Elite	6
Kosmic Kanga	Micromania	5
Krakatoa	Abbex	8
Krazy Kong	PSS	*
Laser Zone	Quicksilva	8
Laserwarp	Mikro-Gen	6
Last Sunset Lattica	Arcade	*
Lazatron	Contrast	*
Les Flics	PSS	6
Loony Zoo	Phipps	6
Lunar Jetman	Ultimate	8
Manic Miner	Bug-Byte	9
Matrix	Salamander	7
Maze Death Race	PSS	*
Maziacs	dk'tronics	8
Metagalactic Llamas	Salamander	8
Mission Impossible	Silversoft	6
Mission Omega	Pulsonic	4
Monkey Biznes	Artic	7
Moon Alert	Ocean	*
Moons of Tantalus	Cornhill	5
Mr Wimpey	Ocean	7
Mummy Mummy	Lothlorien	6
Munnery's Mergatroids	Abacus	6
Night Gunner	Digital Integration	6
1994	Visions	4
Olympimania	Automata	6
Orion	Software Projects	5
Pat the Postman	Mikro-Gen	*
Pedro	Beau Jolly	7
Penetrator	Melbourne House	7
Pi-Balled	Automata	7
Pi-Eyed	Automata	6
Pingo	Profisoft	6
Psi-Spy	Postern	5
Pssst	Ultimate	7
Psytron	Beyond	9
Pyjamarama	Mikro-Gen	8
Pyramid	Fantasy	8
Raider Cursed Mine	Arcade	*
Rapscallion	Bug-Byte	6
Reactor	Gemini	7
Rescue	Comp. Rentals	*
Rescue	Ocean	*
Revenge of the Killer Tomatoes	Visions	6
Rider	Virgin	6
River Rescue	Creative Sparks	3
Robot Riot	Silversoft	6
Rommels Revenge	Crystal	8
Sabre Wulf	Ultimate	8
Scuba Dive	Durrell	9
Security Shelter	Add-on	*
Skull	Games Machine	5
Snowball	Level 9	9
Sorcery	Virgin	7
Space Station Zebra	Beyond	6
Spectron	Virgin	6
Spellbound	Beyond	7
Splat	Incentive	8
Stagecoach	Creative Sparks	7
Stop the Express	Sinclair	8
Strangeloop	Virgin	9
Submarine Strike	Pulsonic	6
Tank Trax	Mastertronic	3
Terrahawks	CRL	5
The Guardian	PSS	6
The Pyramid	Fantasy	7
The Snowman	Quicksilva	8
3D Bat Attack	Cheetahsoft	6
3D Lunattack	Hewson	6
3D Seiddab Attack	Hewson	5
3D Star Wars	Add-on	1
3D Tank Duel	Real Time	6
3D Tunnel	New Generation	9
Tiler Tim	Microwish	6
Time Gate	Quicksilva	8
Timebomb	CDS	7
Tobor	Add-on	7
Tornado Low Level	Vortex	8
Tranz Am	Ultimate	*
Trashman	New Generation	8
Travel with Trashman	New Generation	7
Traxx	Quicksilva	7
Tribble Trubble	Software Projects	8
Trom	dk'tronics	4
Tutankhamun	Micromania	8
Two-Gun Turtle	Lothlorien	7
Warlock of Firetop Mountain	Penguin	*
Wheelie	Microsphere	7
Worm Attack	Pulsonic	2
Worse Things Happen at Sea	Silversoft	7
Wrath of Magra	Mastervision	8
Xadom	Quicksilva	4
Zig-Zag	dk'tronics	7
Zipper Flipper	Sinclair	4
Zombie Zombie	Quicksilva	7

Business

Account Management System	Fulwood	*
Accounts (Limited Company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Address File	SD Micro	*
Address Manager	OCP	7
Bank Account System	K Gouldstone	8
Bank Verifier	SD Micro	*
Business Bank Account	Transform	*
Cash Controller	Shepherd	7
Collector's Pack	Sinclair	7
Critical Path Analysis	Hilderbay	*
Database	Microl	7
DIY Book-keeping	RAMTOP	*
Heathplanner	Heath Computing	7
Home Budget	Kuma Computers	5
Investment, Insurance, Information	Inform	5
Invoicing/Accounting	Transform	8
Keyfile	Keysoft	7
Masterfile	Campbell	8
Micropen	Contrast	5
Money Manager	Creative Sparks	6
Multi-File	ISP	6
Omnicalc	Microsphere	9
Payroll	Hilderbay	9
Payroll	Transform	*
Payroll	V&H Computing	*
Personal Banking System	Hilton	*
Personal Financ. Management Syst.	Fulwood	*
Sales Day Book	Transform	*
Sales Ledger	Hestacrest	8
Small Business Accounts	Sinclair	*

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Software Directory

Spectext	McGraw Hill	7
Spreadsheet	Microl	7
Stock Control	Hilderbay	*
Stock Control	Kemp	*
Stock Control	Transform	*
Tasword	Tasman	8
Tasword II	Tasman	9
Utility File	SD Micro	*
Word Processor	Microl	*
Word Processor	Quicksilva	2

Education

ABC Liftoff	Longman	*
Angle	Chalksoft	5
Angle Turner	Arnold Wheaton	7
Astro Maths	Scisoft	6
Blockbuster	Compusound	7
Castle	L'Ensouleiado	7
Castle of Dreams	Widgit	7
Castle Spellerous	Sinclair	8
Chess Tutor 1	Sinclair	7
Cortes	L'Ensouleiado	6
Countabout	Longman	*
Dyslexia Beater	Dunitz	8
Eiffel Tower	Chalksoft	6
Electronic Learner's Guide No. 1	ETST	6
French is Fun	CDS	5
French Mistress	Kosmos	*
French Voc Test	Tutorial	*
German is Fun	CDS	8
German Master	Kosmos	*
Guitar Tutor 1	Harlequin	*
Guitar Tutor 2	Harlequin	*
Handwriting	Chalksoft	*
Highway Code	Learning Systems	6
Hotline	Chalksoft	5
Humpty Dumpty	Widget	8
Inkosi	Chalksoft	5
Jungle Jumble	Clever Cloggs	*
Jungle Maths	Scisoft	*
Learn to Read 1-5	Sinclair	7
Letters and Numbers	Jimjams	*
Linkword	Silversoft	6
Look Sharp	Mirrorsoft	7
Magnets	Sinclair	*
Make-a-Chip	Sinclair	*
Mansfield Park	Sussex	7
Mathskills II	Griffin	7
MDA-PCSS	MDA Assoc.	7
Model Maths	Jive	*
Mr T's Measuring Games	Ebury	7
Mr. Men	Mirror	*
Musicmaster	Sinclair	6
Nineteenth C. England	Sussex	8
O Level Chemistry	Calpac	*
O Level Physics	Think Tank	*
Party Time	C. Tutor	*
Pathfinder	Widget	7
Pirate	Chalksoft	7
Quick Thinking	Mirrorsoft	*
Sequences	Chalksoft	5
Spanish Gold	Chalksoft	*
Speak and Spell	S and G	*
Speech Marks	Sinclair	7
Spelling Bee	Image Systems	5
Star Reader	Scisoft	*
Startrucker	Widget	7
Teacher Data	B Farris	8
Tense French	Sulis	7
Time Traveller	Willey	*
Tuner	Soft Cottage	*
Whizz Kid	Comp. Tutor	*
Wizard Box	Scisoft	*
Words and Pictures	Chalksoft	6
Zoo	L'Ensouleiado	6

Language

Forth	Melbourne House	9
Forth	Sinclair	7
48/80 Forth	E London Robotics	7
Hisoft C	Hisoft	9
Logo	Sinclair	9
Micro Prolog	Sinclair	8
Pascal Compiler	Hi-Soft	*
Snail Logo	CP	8
Spec. Forth	Abersoft	9
Spec. Forth	CP	8
ZX Forth	Artic	8

Practical

Astronomer	CP Software	7
Beamscan	Beamscan	9
Computer Cookbook	Bug Byte	5
Cricket Averages	Spartan CC	7
Diet	dk'tronics	*
Diet Master	Diet Master	6
Dietician	Keysoft	4
Engine Diagnostic	Spectrasoft	*
First Aid	Eastmead	4
Football Pools	Hartland	*
How Long have you got?	Eastmead	6
I Ching	Salamander	7
I Ching	Sirius	*
Personal Reminder	SD Micro	*
Spectadraw 2	McAlley	*
Star Gazer	CRL	8
The Complete Guide to Medicine	Eastmead	4
Vega-Table	Vega	7
World Info	Wimsoft	*

Puzzle

Arcturus	Visions	7
Computaword	Work Force	2
Flix	Softricks	7
Hanoi King	Contrast	*
Hareraiser	Haresoft	3
Jumbly	dk'tronics	*
Mazecube	PAL	6
Stuart Henry's Pop Quiz	Bellflower	7
3D Strategy	Quicksilva	8

Simulation

Ashes	Pulsonic	7
Combat Lynx	Durrell	8
Cricket Captain	Allanson	6
Fighter Pilot	Digital Integration	*
Flight Simulation	Sinclair	6
Full Throttle	Micromega	8
Golf	dk'tronics	*
Golf	Virgin	8
Hareraiser	Haresoft	3
Howzat	Wyvern	8
Inkos	Chalksoft	*
Match Point	Sinclair	9
New Birkdale	Hornby	8
Olympics	CRL	6
Royal Birkdale	Ocean	8
Strike Attack	Micromart	4
Super Soccer	Winters	4
Test Match	Comp. Rentals	6
The Forest	Phipps	7
Troon	Hornby	8
United	CCS	4
World Cup Football	Artic	7

Strategy

Airline	CCS	7
Angler	Virgin	6
Apocalypse	Red Shift	*
Battle 1917	CCS	8
Battle of Britain	Microgame	*
Brewery	CCS	8
British Lowland	CCS	*
Caribbean Trader	E. Midland	7
Conflict	Martech	*
Conquest	Cheetahsoft	6
Dix Mille	CCS	5
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Football Manager	Addictive Games	7
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Gatecrasher	Quicksilva	7
General Election	Bug-Byte	1
Golf	Virgin	7
Great Britain Ltd	Hessel	7
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It's Only Rock 'n' Roll	K-Tel	5
Johnny Reb	Lothlorien	*
King Arthur	E. Midland	*
Millionaire	Incentive	7
Mugsy	Melbourne House	8
New Venture	Falcon	4
1984	Incentive	7
Oligopoly	CCS	7
Plunder	CCS	8
Red Weed	Lothlorien	7
Reichswald	MW Gamesworld	3
Scatterbrain	Manor	7
Sheepwalk	Virgin	7
Special Operations	Lothorien	8
Spectrealm	Runesoft	6
Star Trader	Bug-Byte	6
Stonkers	Beau Jolly	9
Super-League	Cross	6
Tradewind	WDS	*
War 70	CCS	8
Warlord	Lothlorien	*
Whodunnit	CCS	8
Wilfred the Hairy	Microbyte	2

Traditional

Arcturus	Visions	7
Backgammon	CP Software	7
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Bridge Master	Serin	7
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Do Not Pass Go	Work Force	6
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Superchess III	CP Software	9
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Voice Chess	Artic	9
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ZX Draughts	CP Software	7
ZX Reversi	CP Software	7
ZX-Chess II	Artic	*

Utility

Allsort S-1	A Firminger	7
Assembler	Artic	6
Beyond Basic	Sinclair	5
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Assembler Dev. Package	Metacomco	9

Software Publishers

A & F Software, Unit 8, Canalside Industrial Estate, Woodbine Street East, Rochdale, Lancashire OL16 5LB
Abacus Software, 21 Union Street, Ramsbottom, Nr Bury, Lancashire
Abbex, 20 Ashley Close, Manor Hall Drive, London NW4
Abersoft, 7 Maesfallen, Bow Street, Aberystwyth, Wales
Add-on Electronics, Units 2,3 & 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ
Addictive Games, 7a Richmond Hill, Bournemouth BH2 6HE
ADS, 8 Bronchurch Street, Portsmouth, Hampshire PO4 8RY
Allanson Computing, 77 Chorley Road, Adlington, Chorley, Lancashire PR6 9LH
Alligata Software, 1 Orange Street, Sheffield S1 4DW
APS, 1 Golden Square, London W1
Arcade Software, Technology House, 32 Chislehurst Road, Orpington, Kent BR6 0DG
Arnold Wheaton, Parkside Lane, Dewsbury Road, Leeds LS11 5TD
Artic Computing, Main Street, Brandesburton, Driffield YO25 8RG
Automata UK, 27 Highland Road, Portsmouth, Hampshire P04 9DA
Axis, 71 Brookfield Avenue, Loughborough, Leicestershire LE11 3LN
Beau-Jolly, 19A New Broadway, Ealing, London W5
Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex UB6 7QP
Betasoft, 92 Oxford Road, Moseley, Birmingham B13 9SQ
Beyond Software, 8 Herbal Hill, London EC1
Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire SK6 5BE
Bridgemaster, Sandymouth, Beeches Road, Farnham Common, Buckinghamshire SL2 3PS
Buffer Micro, 310 Streatham High Road, London SW16
Bug-Byte, Mulberry House, Canning Place, Liverpool L1 8JB
Calpac Computer Software, 108 Hermitage Woods Crescent, St Johns, Woking, Surrey
Campbell Systems, 57 Trap's Hill, Loughton, Essex IG10 1TD
CCS, 14 Langton Way, Blackheath, London SE3 7TL
CDS Micro Systems, Silver House, Silver Street, Doncaster, South Yorkshire DN1 1HL
Century Communications, Portland House, 12-13 Greek Street, London W1V 5LE
Chalksoft, 37 Willowslea Road, Northwick, Worcester
Channel 8, 51 Fishgate, Preston, Lancashire PR1 8BH
Cheetahsoft, 24 Ray Street, London EC1R 3DJ
Clever Clogs, Argus Press Software Group, 1 Golden Square, London W1R 3AB
Collins, 18/20 Stephenson Way, North Gower Street, London NW1 2DX
Compusound, 32/33 Langley Close, Redditch, Worcester B98 0ET
Computatutor, 3 Thalia Close, Greenwich, London SE10 9NA
Contrast Software, Warren Road, Liss, Hampshire GU33 7DD
Cornhill Software, 2 Penrith Way, Aylesbury, Buckinghamshire HP21 7JZ
CP Software, 1 Glebe Road, Uxbridge, Middlesex UB8 2RD
Craig Communications, PO Box 46, Basingstoke, Hampshire
Creative Sparks, Thomson House, 296 Farnborough Road, Farnborough, Hampshire
CRL, 9 King's Yard, Carpenters Road, London E15 2HD
Cross Software, 36 Langford Crescent, Barnet, Hertfordshire EN4 9EH
Crystal Computing, 2 Ashton Way, East Herrington, Sunderland SR3 3RX
CSP Systems, 213 Stainbeck Road, Leeds
D Pinch, 72 Norwood Crescent, Coldbrook, Barry, South Glamorgan
Digital Integration, Watchmoor Trade Centre, Watchmoor Road, Camberley, Surrey GU15 3AJ
DJL, 9 Tweed Close, Swindon, Wiltshire SN2 3PU
dk'tronics, Unit 6, Shire Hill Ind Est, Saffron Walden, Essex CB11 3A
Domark, 228 Munster Road, London SW6
Dorcas Software, 3 The Oasis, Glenfield, Leicester
Doric Computer Services, 3 The Oasis, Glenfield, Leicester LE3 8QS
Dunitz, 154 Camden High Street, London NW1 0NE
Durrell Software, Castle Lodge, Castle Green, Taunton TA1 4AB
Dymond Software, 22 Hospital Road, Annan, Dumfriesshire DG12 5HP
Dynavision Production Studio, PO Box 96, Luton LU3 2JP
East London Robotics, St Nicholas House, The Mount, Guildford, Surrey GU2 5HN
Eastmead, Eastmead House, Lion Way, Camberley, Surrey GU16 5EZ
Ebury Press, Humphrey Bull & Barker, 62 Dean Street, London W1V 5HG
Electric Abacus, Oaklands House, Solartron Road, Farnborough, Hants
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Fantasy Software, Fauconberg Lodge, 27a St Georges Road, Cheltenham
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Games Machine, 40 Fretherne Road, Welwyn Garden City, Hertfordshire AL8 6NU
Gamma Software, 12 Milverton Road, London NW6 7AS
Gargoyle Games, 4 North Western Arcade, Birmingham BS 5LH
Gavin Barker, 12 Feming Field, Shotton Colliery, County Durham DH6 2JF
Gemini Software, 18a Littleham Road, Exmouth, Devon EX8 2QG
Gemtime Software Division, 16 Ben Ledi Road, Kirkcaldy, Fife KY2 5RP
Gilsoft, 30 Hawthorn Road, Barry, South Glamorgan, South Wales
Gouldstone, 45 Burleigh Avenue, Wallington, Surrey SM6 7UG
Granada Publishing, 8 Grafton Street, London W1X 3LA
Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS
Griffin & George, Frederick Street, Birmingham B1 3HT
Haresoft, PO Box 365, London NW1
Harlequin Software, 43 Osprey Park, Thornbury, Bristol BS12 1LY
Hartland Software, 32 Ivor Place, London NW1 6DA
Heath Computing, 7 The Meadows, Flackwell Heath, Buckinghamshire HP10 9LX
Heinemann Computer Education, 22 Bedford Square, London WC1B 3HH
Hessel, 15 Lythan Court, Cadwell Crescent, Sunningdale, Berkshire
Hestacrest, PO Box 19, Leighton Buzzard, Bedfordshire LU7 0DG
Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon
Hilderbay, 8/10 Parkway, Regents Park, London NW1 7AA
Hilton Computer Services, 14 Avalon Road, Orpington, Kent
Hisoft, 180 High Street, Dunstable, Bedfordshire LU6 1AT
Hodder & Stoughton, PO Box 6, Dunton Green, Sevenoaks, Kent TN13 2XX
Homestudy Ltd, Treleigh Woods Farm, Treleigh, Redruth, Cornwall TR16 4AW
Hornby Software, 21 Penfold Hill, Leeds LS15 0PW
Image Systems, 34 Lynwood Drive, Worcester Park, Surrey KT4 7AB
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ISP Marketing Ltd, Crown Hill, 38B High Street, Godalming, Surrey GU7 1DZ
JK Greye Software, 16 Park Street, Bath, Avon BA1 2TE
JRS Software, 19 Wayside Avenue, Worthing, Sussex BN13 3JH
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Lerm, 10 Brunswick Gardens, Corby, Northamptonshire
Level Nine, 229 Hugenden Road, High Wycombe, Buckinghamshire HP13 5PG
Logic 3, Unit 18, Wye Ind Est, London Road, High Wycombe, Buckinghamshire
Longman, Longman Group, Longman House, Harlow, Essex CM20 2JE
Lothlorien, 56a Park Lane, Poynton, Stockport, Cheshire SK12 1RE
Manor Software, 24 Manor Gardens, London SW20
Martech Games, 9 Billingburgh Road, Eastbourne, East Sussex BN20 8LY
Mastertronic, (as for Mastervision)
Mastervision, Park Lorne, 111 Park Road, London NW8 7SL
McAlley, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD
McGraw Hill, Shoppen Hangers Road, Maidenhead, Berkshire
Medidata, PO Box 26, London NW9 9BW
Melbourne House, Castle Yard House, Castle Yard, Richmond TW10 6TF
Metacomco, 26 Portland Square, Bristol BS2 8RZ

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Software Directory

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Micro Dealer UK, Unit 6, Marlborough Road Trading Estate, Lattimore Road, St Albans, Hertfordshire
Micro Wish, PO Box 15, Colne, Lancashire BB8 9DB
Microbyte, 19 Worcester Close, Lichfield, Staffordshire
Microcosm, 68 The Glade, Clayhall, Ilford
Micromania, 14 Lower Hill Road, Epsom, Surrey KT19 8LT
Micromega, 230/236 Lavender Hill, London SW11
Microsphere, 72 Roseberry Road, London N10 2LA
Mikro-Gen, 44 The Broadway, Bracknell, Berkshire RG12 1AG
Minatron Computing, 34 Pinewood Close, Westbury on Trym, Bristol BS9 4AJ
Mirrorsoft, PO Box 50, Bromley, Kent BR2 9TT
Monitor Software, PO Box 442, London NW7 2JF
Mosaic, 187 Upper Street, London N1 1RQ
MW Gamesworld, 12 Lawnswood Avenue, Chasetown, Walsall WS7 8YD
Myrmidon Software, PO Box 2, Tadworth, Surrey KT20 7LU
Naigram Software, c/o Soho Synth House, 18A Soho Square, London W1V 5FB
Nectarine, 837 Yeovil Road, Slough SL1 4JH
New Generation Software, FREEPOST, Bath BA2 4TD
Newsoft, 12 White Broom Road, Hemel Hempstead, Hertfordshire
NTD Software, 19 Radipole Road, London SW6
Oasis Software, 9a Alexandra Parade, Weston-Super-Mare, Avon BS23 1QT
Ocean Software, 6 Central Street, Manchester M2 5NS
OCP, 4A High Street, Chalfont St Peter, Buckinghamshire SL9 9QB
Orwin Software, 26 Brownlow Road, Willesden, London NW10 9QL
Penguin, 536 King's Road, London SW10
Phipps Associates, 172 Kingston Road, Ewell, Surrey
Phoenix Publishing, 14 Vernon Road, Bushey, Hertfordshire WD2 2JL
Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB
Pooter Games, 24 Parsloes Avenue, Dagenham RM9 5NX
Poppysoft, The Close, Common Road, Headley, Newbury, Berkshire
Positive Image Software, 129 Dumbarton Road, Glasgow
Postern Software, PO Box 2, Anderovers Ford, Cheltenham, Gloucester GL54 5SW
Print 'n' Plotter Products, 19 Borough High Street, London SE1 9SE
Protek Computing, 1a Young Square, Brucefield Ind Park, Livingston, West Lothian
PSS, 452 Stoney Stanton Road, Coventry CV6 JDG
Pulsonic, Warwick Distribution Ltd, 3 Standard Road, Park Royal, London NW10 6EX
Quest International Computer Systems, Gillingham House, 38-44 Gillingham Street, London SW1
Quicksilva, Palmerstone Park House, Southampton, Hampshire S01 1LL
R and R, 34 Burton Road, Gloucester GL4 0LE
RAM Writer, 3 Vumba House, 2 Cedar Gardens, Sutton, Surrey
Ramtop Services, 5 Rue D'Artois, 75008, Paris, France
Red Shift, 12c Manor Road, Stoke Newington, London N16 5SA
Romantic Robot, 113 Melrose Avenue, London NW2 4LX
Romik Software, 272 Argyll Avenue, Slough SL1 4HE
Rose Software, 148 Widney Lane, Solihull, West Midlands
Runesoft, Charnwood House, Crossgate Drive, Nottingham NG2 TLW
Salamander Software, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL
Scisoft, 5 Minster Gardens, Newthorpe, Eastwood, Nottingham NG16 2AT
SCR Adventures, 190 Shelbourne Road, Tottenham, London
SD Microsystems, 9 Cadwell Court, Hitchin, Hertfordshire SG4 0AQ
Selec Software, 37 Councillor Lane, Cheadle, Cheshire
Serim Software, Freepost, Dept SU7, PO Box 163, Slough, Berkshire SL2 3YY
Shards, Suite G, Roycraft House, 15 Linton Road, Barking, Essex
Shepherd Software, Elm House, 23-25 Elmshott Lane, Chippenham, Slough, Berkshire
Shiva Publishing, 64 Welsh Row, Nantwich, Cheshire CW5 5BR
Silversoft, London House, 271/273 King Street, London W6 9LZ
Sinclair Research, 6 Kings Parade, Cambridge
Soft Cottage, 19 Westfield Drive, Loughborough, Leicestershire LE11 3QJ
Soft Tech, 31 Lampits, Hoddesdon, Hertfordshire
Softek International, 12/13 Henrietta Street, Covent Garden, London WC2E 8LH
Softel, 5 Durward Drive, Glenrothes, Fife KY6 2LB
Software Farm, 155 White Ladies Road, Clifton, Bristol BS8 2RG
Software Projects, Bear Brand Complex, Allerton Road, Woolton, Liverpool, Merseyside L25 7SE
Spartan CC, 29 Feltham Avenue, East Moseley, Surrey KT8 9BJ
Spectadraw, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD
Spectrasoft, Capital House, Market Place, London W3 6AL
Startersoft, 32 Parkfields, Chippenham, Wiltshire
Stell Software, 36 Limefield Avenue, Whalley, Lancashire BB6 9RJ
Stratagem Cybernetics, 286 Corbin Place, 2E, Brooklyn, New York 11235
Sulis Software, 4 Church Street, Abbey Green, Bath BA1 1FP
Sunshine Books, 12/13 Newport Street, London WC2
Sussex Publication, Townsend Poulshot, Devizes, Wiltshire SN10 1SD
Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL
Temptation Software, 27 Cinque Ports Street, Rye, East Sussex
Terminal Software, Derby House, Derby Street, Bury BL9 0NW
Texgate, 14 Brook Lane, Corfe Mullen, Wimbourne, Dorset
Think Tank, 35 Wellington Road, Wimbledon Park, London SW19
Thor Computer Software, Erskine Industrial Estate, Liverpool L6 1AP
Timedata, 16 Hemmells High Road, Laindon, Basildon, Essex SS15 6ED
Transform, 41 Keats House, Porchester Mead, Beckenham, Kent
Tutorial Software, 'Vilands', Glasllwch Lane, Newport, Gwent NP1 3PS
Ultimate Play the Game, The Green, Ashby de la Zouche, Leicestershire LE6 5JU
Unicorn Micro Systems, 312 Charminster Road, Bournemouth BH8 9RT
University Software, 29 St Peters Street, London N1
US Gold, Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH
Vega Space Systems, 28 Watford Road, St Albans AL1 2AJ
Virgin Games, 2-4 Vernon Yard, London W11
Visions, 1 Feldgate Mews, Studlands Street, London W6
Vortex Software, 280 Brooklands Road, Brooklands, Manchester M23 9HD
Widget Software, 48 Durham Road, London N2 9DT
Wilcox Software, Station Road, Walsall WS7 6JZ
Winters, 24 Swannington Close, Cantley, Doncaster, South Yorkshire
Woosoft, 5 Andrews Close, Robertsbridge, Sussex TN32 5PB
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Sinclair spares and repairs

IF, LIKE MANY other Spectrum owners, you find one day that your computer has died, you will have a major problem on your hands. Phoning the Sinclair Research customer relations department in Camberley will not help very much either.

If your electronics knowledge is limited, then you will decide to send your Spectrum to one of the companies who specialise in repairing computers. If you have a good working knowledge of electronics then the addresses listed below should enable you to obtain most replacement parts to repair your computer. Some of the simpler repairs, such as those involving keyboards can be undertaken by those with limited knowledge.

If your computer is under guarantee then it is important that you do not invalidate that guarantee. Talk to the customer service division at Sinclair Research and they will tell you where to send it. When returning the computer put a note in describing the fault as briefly as possible, as this will speed the repair process.

Suppliers of Sinclair parts:

Adaptors and Eliminators, 14 Thames Street, Louth, Lincolnshire. (050782) 8011. Spectrum and ZX-81 power supplies.

ASTEC (UK), 16 Albury Close, Reading, Berkshire. (0734) 53067. Supplies modulators for all countries PAL, NTSC, SECAM.

CPC, 194-200 North Road, Preston, Lancashire. (0772) 555034. Supplies all parts for Spectrum, ZX-81, ZX printer, ZX RAM pack including all case parts, power supplies and keyboard parts. Probably the best place to get ULA, ROM, case parts and keyboard.

Ferranti Semiconductors, Computer Road, Hollinwood Avenue, Oldham, Lancashire. (061) 682 6844, (061) 624 0515/6661. Supplies Spectrum and ZX-81 ULA.

Maplin Electronics, Southend on Sea, Essex. (0702) 552961. Supplies general components and data and technical books.

National Semiconductors (UK) Ltd, 301 Harpur Centre, Horne Lane, Bedford. (0234) 47147. Supplies Spectrum RAM/74LS series TTL; LM 1889 video chip.

NEC (UK) Ltd, Block 3, Carfin Industrial Estate, Motherwell. (0698) 73221. Supplies Spectrum ROM and RAM/74LS TTL; Z80A.

Sinclair Research Ltd, Camberley, Surrey. (0276) 685311.

Texas Instruments, Manton Lane, Bedford, Bedfordshire. (0234) 223000, (0234) 211655. Supplies RAM 4116, 4532, 4164, 74LS TTL (Spectrum).

Timex Corporation, Camperdown Plant, Harrison Road, Dundee, Tayside. (0382) 819211. Makers of Spectrum, ZX-81, Printer, Interface one, Microdrives, RAM Pack. Repair and service for Sinclair.

Verran (Computerfix), Units 2H & 2J, Albany Park, Frimley Road, Camberley, Surrey. (0276) 66266. Repairs Spectrums and ZX-81.

Zilog (UK) Ltd, Zilog House, 45-53 Moorbridge Road, Maidenhead, Berkshire. (0628) 39200. Supplies Z80A.

Component companies

SOME OF THE large companies mentioned above do not like dealing directly with the public. The following is a list of component companies which should be happy to deal with you. Most will have catalogues available and will supply data sheets for their products on demand.

These firms are only distributors and they do not make components. If you have a problem with a particular device contact the manufacturer as listed above because not many of the distributors can answer technical questions; RS Components, Farnell, Ambitt and Hawkes may do. Anyone needing NEC parts should phone them direct and ask for some distributors dealing with them.

Abacus Electronics, Kennet House, Pembroke Road, Reading, Berkshire. (0734) 33311. Makes dealt with: National Semiconductors, SGS.

Access Electronic Components Ltd, Austin House, Bridge Street, Hitchen, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.

Alpha Electronic Components Ltd, 66 Wilbury Way, Hitchin, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.

AM Lock Distribution Ltd, Nevill Street, Middleton Road, Oldham, Lancashire. (061) 652 0431. Makes dealt with: Motorola, Mostek.

Anzac Components Ltd, Burnham Lane, Slough, Buckinghamshire. (06286) 4701. Makes dealt with: Hitachi.

Axion Electronics Ltd, Unit F, Turnpike Road, Cressex Industrial Estate, High Wycombe, Buckinghamshire. (0494) 442181. Makes dealt with: Motorola.

BA Electronics Ltd, Millbrook Road, Yate, Bristol. (0454) 315824. Makes dealt with: Texas Instruments.

Celdis Ltd, 37-39 Loverrock Road, Reading, Berkshire. (0734) 585171. Makes dealt with: Motorola, Mostek.

Crellon Electronics Ltd, 380 Bath Road, Slough, Berkshire. (06286) 4434. Makes dealt with: Motorola, SGS, Zilog.

Dialogue Distribution Ltd, Watchmore Road, Camberley, Surrey. (0276) 682001. Makes dealt with: Hitachi.

DTV Group, 10-12 Earnest Avenue, West Norwood, London SE27. (01) 670 6166. Makes dealt with: National Semiconductors.

Farnell Electronic Components Ltd, Canal Road, Leeds. (0532) 636311. Makes dealt with: Hitachi, National Semiconductors.

Hawke Electronics Ltd, Amotex House, 45 Hanworth Road, Sunbury on Thames, Middlesex. (01) 979 7799. Makes dealt with: Motorola, Texas Instruments. Will answer technical queries.

Hill Electronics (NI) Ltd, 290 Antrim Road, Belfast, Northern Ireland. Makes dealt with: Mostek.

ITT Multicomponents, Edinburgh Way, Harlow, Essex. (0279) 442971. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Macro Marketing Ltd, Burnham Lane, Slough, Berkshire. (06286) 4422. Makes dealt with: Motorola, National Semiconductors, Zilog, Texas Instruments.

Quarndon Electronics Ltd, Slack Lane, Derby. (0332) 32651. Makes dealt with: Texas Instruments.

STC Electronics, Edinburgh Way, Harlow, Essex. (0279) 26777. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Computer parts

Z80A: Zilog, SGS, NEC (Spectrum/ZX-81).

ULA: Ferranti (Spectrum/ZX-81).

ROM: Hitachi, NEC (Spectrum), Mostek, Motorola (ZX-81).

RAM: 4116 type — NEC, National Semiconductors, Texas Instruments, ITT (Spectrum). 4532 type — Texas Instruments, OKI (Manhattan Skyline) (Spectrum). 2114 type — Motorola, NEC (ZX-81). 4118 type — Mostek (ZX-81). 2K type — Mostek, Toshiba, Motorola, Texas Instruments, NEC (ZX-81).

LM1889: ICI4 — National Semiconductors (Spectrum).

TTL: 74LS00/74LS32/74LS157 — Texas Instruments, SGS, Motorola, National Semiconductors, NEC.

The following are all used on the 48K Spectrum.

Regulator: LM7805 +5V Reg. — SGS, NEC, Texas Instruments, Motorola.

Crystals, Capacitors, Resistors, Diodes, Sockets: available through general component suppliers.

Modulator: UM1233 Astec (UK) Ltd.

Leads: available at most TV/electrical shops.

Case parts: Sendale Plastics.

Keyboard: CPC.

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2nd prize: Currah µSpeech Synthesizer (worth £29.90)

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To Celebrate the Christmas season Logic 3 are running a grand Christmas Competition with a ZX Microdrive and Currah µSpeech Synthesizer as first and second prizes.

The ZX Microdrive, complete with Interface 1, is undoubtably the ultimate Spectrum add-on allowing programs and data to be quickly saved and recalled. The Currch µSpeech is both powerful, featuring an infinite vocabulary, and easy to use.

To enter the competition carefully read the reviews in this catalogue then answer the questions in the Quiz and mail your answers to Logic 3. All entries received before 31st January will be eligible for the competition. Prizes will be awarded to the first 12 correct entries drawn.

Here's your chance to win these desirable Spectrum add-ons, but don't leave it too late, make sure, your entry reaches Logic 3 before the closing date!

CLUB SUCCESS

The Logic 3 Spectrum Club was launched in July, 1984 and has been an outstanding success. Already more than half-way to its target of 10,000 members in twelve months, the continuous growth of the club has kept Logic 3's staff working seven days a week just to keep up with demand.

Tony Toller, Logic 3's managing director and coordinator of the Club, explains its success as follows: "With other clubs once a person has joined there is no more reason for the club to try to support its members who each month *have* to purchase a certain number of products from a short list. Our Club is different. Members have no obligation to purchase *any* products from the club so the pressure is on us to choose only the best quality products and offer the best possible prices. We also take a lot of pride in publishing independent reviews on all the products we carry and if we do not like something about a product we are not afraid so say so." Tony Toller's policy of offering Club members a real service rather than just running "yet another mail order business" is winning new members all the time. But size by itself is not the main objective "as we grow so we will be able to improve our service to members still further and perhaps, one day, develop the club catalogue into a proper magazine." With the Christmas edition of the catalogue already running at a bumber 20 pages containing reviews of more than 180 products that day may come quite soon!

LOGIC 3

Spectrum Club

The Logic 3 Spectrum Club has something for everyone: regular reviews, excellent savings on all the latest top quality games and educational software, and discounts on hardware.

NEW MEMBERS INTRODUCTORY OFFER

Join Logic 3 Spectrum Club *within 60 days* and benefit from our new members introductory offer to purchase our "Software Specials" at a huge discount.

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MOUNTBATTEN HOUSE
VICTORIA STREET
...PERKS.

INSIDE

★ **EDUCATION**
A selection of the most effective educational programs available. Designed for children from the age of 4 to 16.

★ **GAMES**
The best games for the Spectrum selected by our ow review panel and rated according to: graphics, sour colour, originality and inter

★ **PROGRAMMING**
The 'Learn BASIC' tutorials really show you how to wr structured programs in ea understand stages.

★ **UTILITIES**
Design your own games.

★ **HARDWARE**
Some good deals in har and peripherals.

LOGIC 3's SOFTWAR PANEL

Neil Atkinson, pupil of Borlase School, spend weekends in a shop se computer software, in work as a journalist.

Andrew Goltz, directo spent 6 years with Co UK and International instigated Commod 'Approved Product' third party software

Bliss Healey, gradu School of Econom translated busines French, currently design of graphic software.

Tony Toller, direc former journalis business applica and co-ordinato software club.

ic Attack

Machine: 48k
Joystick: Kempston and most others—redefineable keys
Category: Arcade Adventrue
Publisher: Ultimate

BONUS £3.45 PRICE

rice: £5.50 **Club price: £4.95**

uring your quest for The Golden ey of ACG you become trapped n an evil haunted castle. As you vander around the castle's ancient ooms and passages you encounter rankenstein, Dracula and the Devil himself! As you move from room o room you try to ward off the ghouls and pick up any items which may be of use later.
A fast moving 'graphics only' adventure.

Ratings: /10
Graphics: 7
Sound: 6
Colour: 7
Originality: 9
Interest: 7
Order code: ATIAT

Avalon

Machine: 48k
Joystick: Kempston Sinclair Cursor
Category: Graphics/ Adventure
Publisher: Hewson Consultants

Price: £7.95 **Club price: £6.75**

An amazing 3D arcade/adventure. Avalon features 223 rooms on eight levels, and over 100 characters.
You control the "astral projection" of Meroc, a ghostly wizard figure who floats around in an eerie way.
Your mission is to banish the Lord of Chaos who has terrorised peasants by stealing corpses of the dead. You will need various spells and skills which can be found in the rooms of the castle of the Lord of Chaos.
The screen display shows Maroc, the room that he is in, any magical objects, and also any of the 100 other characters. The room and larger magic objects are all drawn in 3D. To collect a magic object or spell you just guide Maroc over it. To cast a spell, use your joystick or keyboard to select the right spell from the spell scroll. Only certain spells will provide defence against certain enemies.
Avalon is a complex game, and you must read the instructions. The graphics are clear and well animated, and the sound is good. Plenty to keep you amused and intrigued for a long time. An original graphics adventure—recommended.

Ratings: /10
Originality: 9

Deus Ex Machina

Machine: 48k
Joystick: No
Category: Strategy
Publisher: Automata

Price: £15.00 **Club price: £13.50**

The prospect of an all star cast performing in stereo sound, synchronised with a computer game and coming from a software house of such standing as Automata was pretty exciting. Perhaps that was the problem. With a lot of software there is such a build up that the product has to be incredible to live up to it all. Deus Ex Machina turned out to be a bit disappointing, but we've included it in our catalogue because because it's a 'first' and it's uniqueness makes it a must for collectors.
To play the game properly you need a tape recorder (preferably stereo hi-fi) as well as your normal Spectrum kit. You load the program and play the audio tape, then there's a countdown routine to enable you to synchronise the start.
The basic theme is the story of life and its struggles. You start as a seed in the womb, progress to becoming and embryo, through birth, life and on into old age. The computer side consists of a number of arcade-style games where you're constantly having to fight off the problems of life, even to the end where you try tp stop your blood cells clotting. The audio tape tells the story and accompanies most of the games with songs.
The soundtrack would do credit to a West End musical, the computer games are average—there's no score so you can't tell how you're doing. Different? Yes. Interesting? Yes, if you're a Psychologist!

Ratings: /10
Graphics: 7
Sound: 10
Colour: 5
Originality: 10
Interest: 6
Order code: DEM

Doomsday Castle

Machine: 48k
Joystick: Kempston Fuller Sinclair Cursor
Category: Arcade/ Adventure
Publisher: Fantasy

Price: £6.50 **Club price: £4.95**

Another high quality arcade adventure from Fantasy. You explore an enormous castle, consisting of no less than *255* labyrinths connected by 49 passages. Get to the corridors by blasting through the doors, whilst avoiding the extraordinary aliens. Recharge your lasers by shocking the aliens

original game of lasting interest.

Ratings: /10
Graphics: 7
Sound: 7
Colour: 7
Originality: 8
Interest: 7
Order code: DOOCA

Jet Set Willy

Machine: 48k
Joystick: Kempston AGF Protek Interface II
Category: Arcade
Publisher: Software Projects

BONUS £3.45 PRICE

Price: £5.95 **Club price: £4.55**

At last! The long awaited sequal to 'Manic Miner'. The saga continues... Miner Willy has gone from rags to riches. Guide Willy around his clifftop mansion, as he searches for all the bottles and glasses after a party, before his housemaid, Maria, will let him crash out in bed. Check the beach, down the road, and on the rooftop.
Over 70 screens, amazing graphics and humour add up to make this one of the best for the Spectrum.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 7
Originality: 9
Interest: 8
Order code: JETSE

Jokers Wild

Machine: 48k
Joystick: No
Category: Arcade/Adventure
Publisher: Phoenix Software

BONUS £3.45 PRICE

Price: £6.99 **Club price: £5.60**

A high quality value for money package—two games for the price of one. One game is arcade style, the other adventure.
Your mission is to defeat your enemies who are travelling the universe disguised as magicians. This year, the fair which they travel with has been set up on earth. Here they have been hypnotising unsuspecting earthlings, who are then led into 'bunko-booths' where they are robbed of their souls. The enemy's main power lies in a pack of hypnotic cards, which you must try to capture, first in the arcade game, then in the adventure.
Before you can play the adventure, you have to reach at least level 4 of the arcade game. From here on, on completion of each level further clues for use in the adventure are given. For those of you whose arcade or adventure playing skill is not quite up to scratch there is a useful 'Panic-Packet', which contains useful clues to help your game play. Good value.

Ratings: /10
Graphics: 6
Sound: 5
Originality: 8
Interest: 7
Order code: JOKWI

Manic Miner

Machine: 48k
Joystick: Kempston AGF Protek Interface II
Category: Arcade/Adventure
Publisher: Software Projects

BONUS £3.45 PRICE

Price: £5.95 **Club price: £4.55**

Willy the Miner has fallen down a disused mine shaft. He works his way through the various levels collecting keys and searching for secret treasure. Manic Miner is a classic arcade game for the Spectrum—There are 20 caverns to penetrate, each requiring its own bit of ingenuity to ensure success. A classic game that set the standards others are judged by.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 9
Originality: 9
Interest: 9
Order code: MANSP

Mugsy

Machine: 48k
Joystick: No
Category: Strategy
Publisher: Melbourne House

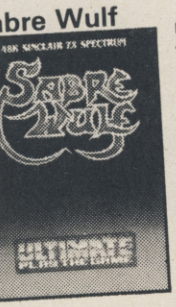
BONUS £4.95 PRICE

Price: £6.95 **Club price: £5.55**

From the publishers of the top selling adventure—The Hobbit—comes their newest release, MUGSY. The game can best be described as a comic strip featuring animated characters.
As Mugsy, you must organise your gang and their dealings—such as protection rackets and the purchase of weapons and ammunition, and most important of all make sure that your gang stays on top.
Muscle in on the action!

Ratings: /10
Graphics: 9
Sound: 9
Colour: 8
Originality: 10
Interest: 9
Order code: MUGSY

Sabre Wulf



Machine: 48k
Joystick: Kempston Cursor Sinclair Interface II
Category: Arcade/Adventure
Publisher: Ultimate

BONUS £6.95 PRICE

Price: £9.95 **Club price: £8.45**

From the publishers of Spectrum classics such as Atic Atac and Lunar Jetman now comes SABRE WULF, an arcade/adventure epic set in the deepest jungle.
The deeper you explore, risking life and limb, the more challenges you face: hippos, rhinos, warthogs, tarantulas, bats and at least 30

LOGIC 3

...ude, temperature, ...weapon and navigation ...

...3D game featuring ...h, realistic graphics. ...ded.

Originality: 9
Interest: 8
Order code: COMLY

...Thompson's ...hlon

Machine: 48k
Joystick: Kempston Sinclair
Category: Arcade
Publisher: Ocean

BONUS £4.95 PRICE

...e: £6.90 **Club price: £5.85**

...mpeting against the computer ...u are Daley Thompson, facing ...n gruelling events.
...n the first day you can choose to ...mpete in the 100 metres, long ...mp, shot-put, high jump and 400 ...etres. The second day's events ...re the 110 metres hurdles, discus, ...pole-vault, and the 1500 metres. ...n the running events you animate ...Daley by either pressing two keys ...alternately, or rapidly moving the ...joystick from side to side. In the ...hurdles you press the fire button to ...jump. The throwing events require ...a little more skill and timing and a ...little less finger stamina!! In the ...long jump, after a good run up try ...to get a take-off angle as near to ...45 degrees as possible. In the high ...jump, judge your take-off and the ...right time to fall, without knocking ...off the bar. In the pole-vault get ...the pole as close to 90 degrees as ...you can and plant it in the right ...place. In the javelin and discus ...work up a really powerful throw ...and remember to release it on ...time! There is a comprhensive on ...screen score board showing world ...records, qualifying times, etc. ...the graphics and animation are ...good and keyboard play is very ...responsive. Novel touches, like the ...officials coming out and measuring ...long jumps, the crowd cheering, ...and Daley scratching his head or ...leaping around, add to the ...enjoyment of a good game.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 8

Originality: 6
Interest: 9
Order code: DALSP

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LOGIC 3

...lefeat them. This is a ...ll new adventure from ...nd the elaborate ...ons of the many locations ...llent once again. From ...ic encounters with ..., through the bustle of a ...Market town to the Middle ...ld beyond to the future, ...ne is a must for history ...nd frustrated time-travellers

...: /10
...s: N/A
...lity: 8
...t: 9

Order code: LOTSP

...ojects

...hania

Machine: 48k
Joystick: No
Category: Adventure
Publisher: Automata

BONUS £4.95 PRICE

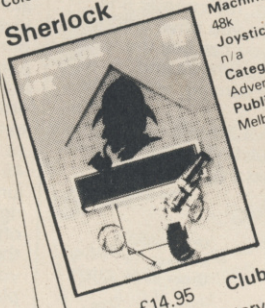
...rice: £10.00 **Club price: £7.50**

...cult adventure from Automata ...hat will keep you busy for ...months? No, probably years. ...Featuring the Pi-Man and some ...very high quality, amusing graphics ...too (also a free hit single and a ...chance to win £6,000).

Ratings: /10
Graphics: 7
Sound: 4
Colour: 4

Originality: 8
Interest: 6
Order code: PIMAN

Sherlock



Machine: 48k
Joystick: n/a
Category: Adventure
Publisher: Melbourne House

Price: £14.95 **Club price: £12.95**

Not at all elementary, my Dear Watson!
You play the character of Holmes, while other characters behave according to their own personality. The game uses a technique called 'Inglish' which allows you, Holmes, to talk to the other characters to obtain information and crack the case! Throughout the game, time is displayed by a clock on the screen and the detail is unbelievable; for instance you can travel from Baker Street in a taxi to your destination but you must call the taxi, tell him your direction of travel and then pay him! The large vocabulary allows many different commands to be given, but you must remember to leave time for Holmes to sleep! The game shows both text and graphical representation on the screen and can last for up to a month by saving it after each session. Superb entertainment, brilliantly absorbing!

Ratings: /10
Graphics: 7
Sound: n/a
Colour: 8

Originality: 10
Interest: 10
Order code: SHERL

Dartz

Machine: 48k
Joystick: No
Category: Simulation
Publisher: Automata

Price: £5.00 **Club price: £4.00**

At last—a good simulation of darts for your home computer. Aim carefully at the board but take into account the number of pints you've had tonight, and the crowd

...: **£8.45**

...g with
...you
...-zones,
...will

Manic Miner

Machine: 48k
Joystick: Kempston AGF Protek Interface II
Category: Arcade/Adventure
Publisher: Software Projects

Price: £5.95 **Club price: £4.55**

Willy the Miner has fallen down a disused mine shaft. He works his way through the various levels collecting keys and searching for secret treasure. Manic Miner is a classic arcade game for the Spectrum—There are 20 caverns to penetrate, each requiring its own bit of ingenuity to ensure success. A classic game that sets the standard others will be judged by.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 9

Originality: 9
Interest: 9
Order code: MANSP

Mugsy

Machine: 48k
Joystick: No
Category: Strategy
Publisher: Melbourne House

BONUS £4.95 PRICE

Price: £6.95 **Club price: £5.55**

From the publishers of the top selling adventure—The Hobbit—comes their newest release, MUGSY. The game can best be described as a comic strip featuring animated characters. As Mugsy, you must organise your gang and their dealings—such as protection rackets and the purchase of weapons and ammunition, and most important of all make sure that your gang stays on top.
Muscle in on the action!

Ratings: 10
Graphics: 9
Sound: 9
Colour: 8

Originality: 10
Interest: 9
Order code: MUGSY

Machine: 48k
Joystick: No
Category: Arcade/Adventure
Publisher: Phoenix Software

BONUS £3.45 PRICE

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...e is arcade style,
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...o defeat your
...e travelling the
...ed as magicians.
...ir which they travel
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...been hypnotising
...arthlings, who are
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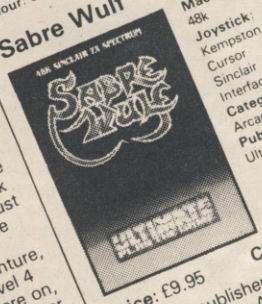
...h the adventure.
...an play the adventure,
...reach at least level 4
...e game. From here on,
...on of each level further
...e in the adventure are
...hose of you whose
...dventure playing skill is
...p to scratch there is a
...ic-Packet', which
...seful clues to help your
... Good value.

Club price: £5.60

Sabre Wulf



Machine: 48k
Joystick: Kempston Cursor Sinclair Interface II
Category: Arcade/Adventure
Publisher: Ultimate

Price: £9.95 **Club price: £8.45**

From the publishers of Spectrum classics such as Atic Atac and Lunar Jetman now comes SABRE WULF, an arcade/adventure epic set in the deepest jungle. The deeper you explore, risking life and limb, the more challenges you face: hippos, rhinos, warthogs, tarantulas, bats and at least 30

Originality: 8
Interest: 7
Order code: JOKWI

Make your own economy cut this Christmas!

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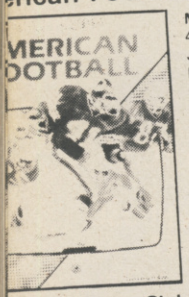


Machine: 48k Spectrum
Joystick: No
Category: Strategy
Publisher: Argus Press

e: £9.95 **Club price: £8.45**

erican Football is a strategic ulation, with fast animated phics. You do not control vidual players but instead the ole team responds to your ructions.
the action takes place on the ch which occupies the top of the een. Beneath the pitch is the oreboard that gives all the relevant ormation: the quarter being yed; minutes remaining, etc. This also where you enter your mmands. Play can be against the mputer or another opponent. complex game, but nevertheless eat fun to play, supplied with a full uide to American Football and omprehensive instructions.

atings: /10
raphics: 7
ound: 6
olour: 6
Originality: 9
Interest: 7
Order code: AMEFO

Pool

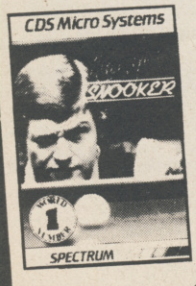
Machine: ZX Spectrum, 16/48k
Joystick: No
Category: Simulation
Publisher: CDS Micro Systems

Price: £5.95 **Club price: £4.45**

A really excellent simulation of the game of Pool using the full sound and colour graphics capabilities of the Spectrum to bring the action and excitement of the real game into your home. Use your skill and judgement, and play like the prpfessionals. 1 or 2 player game and demo mode. The *only* pool game worth considering for your 16 or 48k Spectrum.

Ratings: /10
Graphics: 8
Sound: 8
Colour: 8
Originality: 9
Interest: 10
Order code: POOL

Steve Davis Snooker



Machine: 48k Spectrum
Manufacturer: CDS Microsystems

BONUS £5.45 PRICE

Price: £7.95 **Club price: £6.75**

After the incredible success of Ocean's Decathlon, which must in part have been due to the words comes "Steve Davis Snooker". Apart from his signature on the cover there are no other signs of intererence by Steve, but that doesn't in any way detract from the game, which is an excellent piece of programming. A feature we liked—though it is cheating a bit—is that you can go back and re-take your last shot! When you've just sunk the black when you were aiming for the yellow that's a useful feature! Ball control is excellent. You have full control over angle, power and spin and the movement is really smooth. With Currah speech connected the referee makes comments like "Ladies & Gentlemen quiet please", or "foul", plus a few others that are totally incomprehensible.
All in all this is an excellent simulation with smooth movement and very controllable ball action.

Ratings: /10
Graphics: 8
Sound: 8
Colour: 7
Originality: 8
Interest: 9
Order code: SDS

ARCADE SIMULATION

Do you yearn to drive a racing car, compete in the Olympics, or prehaps stand, pint in hand, competing against Eric Bristow and scoring "One hundred and Eighty's" time after time? If so, then you should find an Arcade/Simulation that'll fulfil your ambition—if not in reality, then in excitement and fun. Here we give a selection of the best—chosen not only for their accuracy but also for added touches like the way the athlete reacts to success or failure in Daley Thompson's decathlon, or the scurrying around of the ball-boys in Match Point. Features like these demonstrate imagination on the part of the author just as much as programming skills.

Beach Head

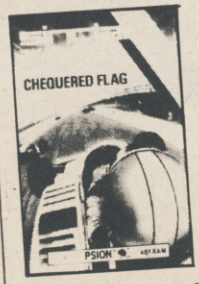
Joystick: Optional and redefineable keys
Category: Arcade Simulation Strategy
Publisher: Access

Price: £7.95 **Club price: £6.45**

Beach Head is a potent combination of arcade action, simulation and strategy, resulting in one of the most exciting *and* most realistic games currently available for the Spectrum. As Admiral of the Fleet, you have to decide between a full frontal assault or whether to try a surprise attack, sending your fleet down a side channel which may be mined. As naval gunman, you face constant harassment from enemy fighters as you try to establish the range of the enemy's ships. Finally, as tank commander, you have to fight your way through the enemy hald beach. If you like action you *must* get this game.

Ratings: /10
Graphics: 10
Sound: 10
Colour: 10
Originality: 10
Interest: 10
Order code: BEASP

Chequered Flag



Machine: 48k
Joystick: None
Category: Simulation
Publisher: Psion/Sinclair

BONUS £2.95 PRICE

Price: £6.95 **Club price: £5.45**

The most sophisticated motor racing simulation available for the Spectrum. Choose from ten tracks including Monaco, Brands Hatch and Silverstone and from three cars, one automatic and 2 with manual gearchange. Instruments include speedo, rev counter and fuel guages. As you drive around the 3D track you can see the nose of your car, the wheels and steering wheel turning, and the road ahead.
Very impressive 3D graphics, if you enjoy 3D simulations, you must add Chequered Flag to your collection.

Ratings: /10
Graphics: 9
Sound: 5
Colour: 6
Originality: 9
Interest: 10
Order code: CHEFL

Combat Lynx

Machine: 48k Spectrum
Joystick: Protek
Category: Arcade/ Simulation
Publisher: Durrel Software

BONUS £5.95 PRICE

Price: £7.95 **Club price: £6.75**

Probably the most comprehensive real-time battle simulation available for your home computer. Combat Lynx can be played simply as an arcade game or more complexly as an arcade simulation. In the air-to-ground battle you are at the controls of a Lynx helicopter. You can select anti-tank, anti-aircraft missiles, machine guns or mines to arm your 'copter with. Your mission is to support your ground forces and to protect your ground bases. The number of bases depends on which of the 4 skill levels you choose.
From the pilot's seat in your Lynx you get a spectacular 3D view of the landscape and enemy troops. Around your view panel there are comprehensive instruments showing altitude, temperature, speed, fuel, weapon and navigation information.
An excellent 3D game featuring very smooth, realistic graphics. Recommended.

Ratings: 10
Graphics: 9
Sound: 8
Colour: 8
Originality: 9
Interest: 8
Order code: COMLY

Daley Thompson's Decathlon

Machine: 48k
Joystick: Kempston Sinclair
Category: Arcade
Publisher: Ocean

BONUS £4.95 PRICE

Price: £6.90 **Club price: £5.85**

Competing against the computer you are Daley Thompson, facing ten gruelling events.
On the first day you can choose to compete in the 100 metres, long jump, shot-put, high jump and 400 metres. The second day's events are the 110 metres hurdles, discus, pole-vault, and the 1500 metres.
In the running events you animate Daley by either pressing two keys alternately, or rapidly moving the joystick from side to side. In the hurdles you press the fire button to jump. The throwing events require a little more skill and timing and a little less finger stamina!! In the long jump, after a good run up try to get a take-off angle as near to 45 degrees as possible. In the high jump, judge your take-off and the right time to fall, without knocking off the bar. In the pole-vault get the pole as close to 90 degrees as you can and plant it in the right place. In the javelin and discus work up a really powerful throw and remember to release it on time! There is a comprhensive on screen score board showing world records, qualifying times, etc. the graphics and animation are good and keyboard play is very responsive. Novel touches, like the officials coming out and measuring long jumps, the crowd cheering, and Daley scratching his head or leaping around, add to the enjoyment of a good game.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 8
Originality: 6
Interest: 9
Order code: DALSP

Dartz

Machine: 48k
Joystick: No
Category: Simulation
Publisher: Automata

Price: £5.00 **Club price: £4.00**

At last—a good simulation of darts for your home computer. Aim carefully at the board but take into account the number of pints you've had tonight, and the crowd

a blackb When you have the correct ination rush along to the stan and reach into the safe. V the safe has been opene game musn't be given away e flashing shields so stop tall flashing by hitting them).

A rea using game with many hum touches that makes it grea to play. Teachers will sho you, and give you lines. Thea school bully and a swot (Ein who tries to tell the head of mission.

Hig commended.

Ra 10
Gr 9
So
C 10

Originality: 10
Interest: 10
Order code: SKODA

Pyramid

Machine: 48k
Joystick: Fuller Kempston AGF Protek Microgen
Category: Arcade/Adventure
Publisher: Fantasy

BONUS £2.95 PRICE

Price: £5.50 Club price: £4.15

Guide Ziggy, equipped with defence shield and phased plasmic laser, through the Pyramid, which consists of 120 chambers on 15 levels. Each chamber is inhabited by one of *60* varieties of weird creatures and aliens, ranging from galactic strawberries to demons and cosmic claws to mutant eyes. This arcade game will continue to amaze you for months, if not years!

Ratings: /10
Graphics: 7
Sound: 4
Colour: 7

Originality: 8
Interest: 8
Order code: THEPY

Strangeloop

Machine: 48k
Joystick: Any
Category: Arcade/Adventure
Publisher: Virgin Games

Price: £6.95 Club price: £5.90

A mammoth arcade/adventure with 240 rooms. The scene is an old ...bot factory, that used to pro...uce domestic robots. That was un... about a hundred years ago, when the factory was taken over by powerful alien forces. Since then no human has set foot in the factory, until now!!!.....

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The top two-thirds of the screen is the playing area, which displays one of the 240 rooms. The rooms

d your gun with the
o their question and fire it
before they land on you.
graphics and sound plus a
difficulty levels to suit any
ke this a favourite with
ild.

Order code: MATIN

...s for Children

Machine: 16/48k
Age range: 3-8 years
Category: Education
Publisher: Stell

...e: £6.95 Club price: £5.25

...set of four educational games ...ides excellent value for money ...se—a series of different ...cts are displayed on the screen ... bed, etc.) You must decide in ...ch room each object belongs, ... move it there.

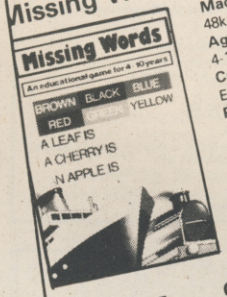
...mble—guess which word is in ...h balloon. Watch it fill with ...our when you type in the right ...swer. You can also add your ...n words and save them.

...cture—can you identify the ...cture? Watch it move across the ...reen when you guess the right ...swer.

...aze—find your way through the ...aze and reach the dog—7 levels.

Order code: MFC

Missing Words



Machine: 48k
Age range: 4-10 years
Category: Education
Publisher: Stell

Price: £6.95 Club price: £5.25

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Section one displays single sentences with a word missing in each. The child must choose the correct word to fill the gap, from a choice of six words. Only two keys are used in this section, making it simple for even the youngest child.

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Order code: MISWO

WIN A MICRODRIVE
For details on how to win our Christmas Competition for a Microdrive and Interface 1, please refer to Page 14.

Originality:
Interest: 10
Order code: UNDER

...e Zombie

Machine: 48k
Joystick: Kempston Sinclair Protek
Category: Arcade/Adventure
Publisher: Quicksilva

...6.95 Club price: £5.90

...azing game that features ...harvellous firsts for the ...um. For the first time 3D ...d graphics are available in ... and Zombie Zombie also ...es the first two channel ... on the Spectrum.

...ame is set in the city of the ...es, in which you arrive by ...pter. When you find a ...le place for landing, you can ... the helicopter and the action ...s.

...can move in any direction and ...un marginally faster than the ...bies, but there are a lot of ...bies and many are hidden ...nd the various maze-like walls ...he city. The Zombies are frail ...tures and can be blown ...y—this is your only defence ...inst them. However as soon as ...y get a taste of your flesh, their ...ength improves dramatically.

...e part of the city that you are in ...n be viewed from 4 different ...gles, and by using a helicopter ...drop or pick up bricks the city ...n be changed infinitely, and ...fferent cities can then be saved ...h tape and loaded at another ...me.

...very impressive program, ...unning 3D graphics and excellent ...ound effects.

...atings: /10
...Graphics: 9
...Sound: 8
...Colour: 8

Originality: 8
Interest: 9
Order code: ZOMZO

...ON

...expeditious flow of air-traffic; safe ...in that all aircraft must be kept ...apart, and expeditious so as to ...avoid undue delay. The work of an ...air traffic controller is very skilled ...and demanding, they each undergo ...about 3 years basic training. It is ...not surprising, therefore, that it ...may take some time to master the ...many tasks involved in this very ...realistic simulation.

Ratings: /10
Graphics: 9
Sound: N/A
Colour: 8

Originality: 10
Interest: 9
Order code: ATC

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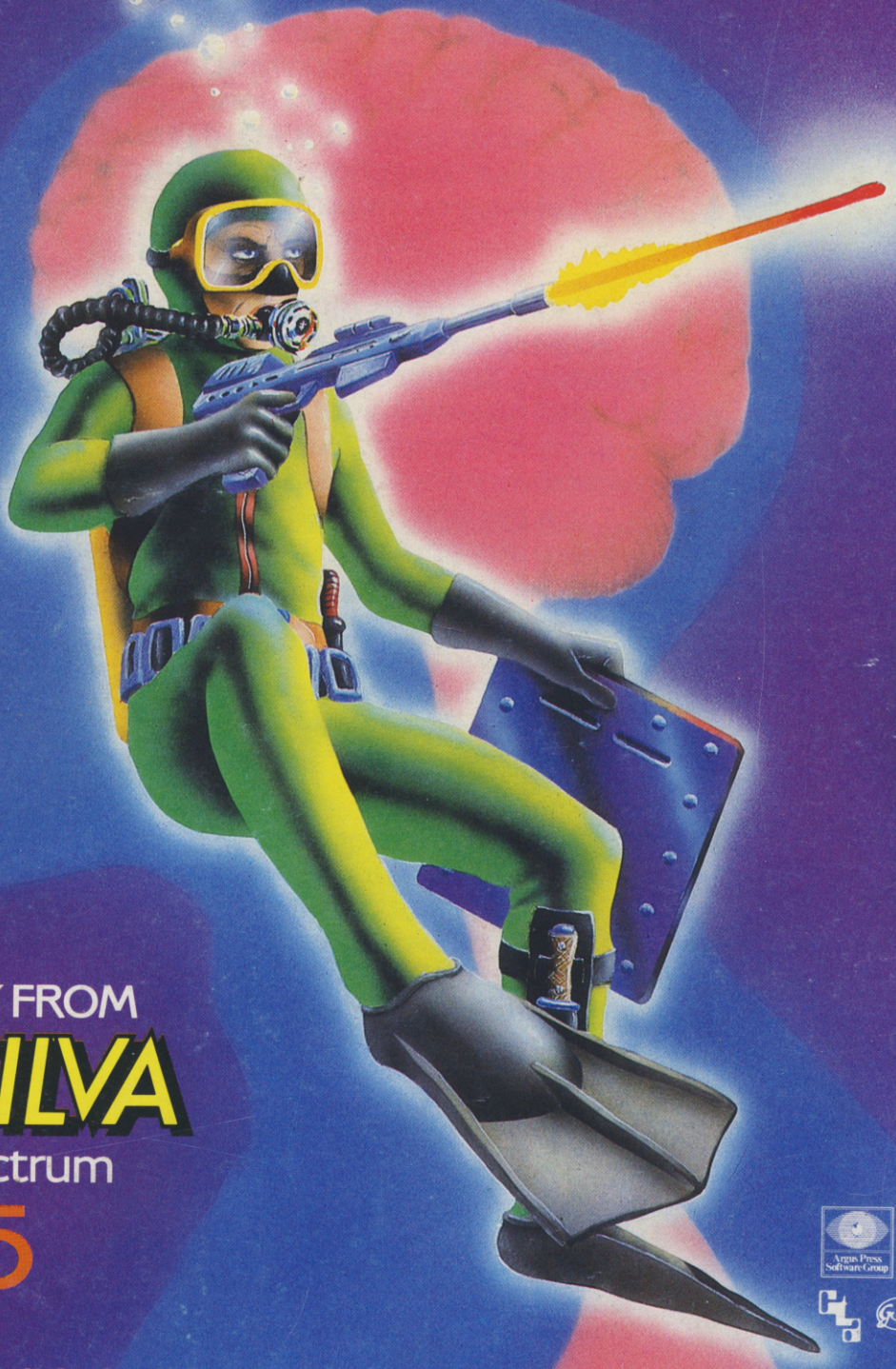

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